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The Political Economy of Global Warming

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DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

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Abstract

The science is unequivocal: the Earth's biosphere is approaching global warming tipping points which, if passed, will become irreversible, taking the planet on a trajectory to a new geological era, unsuitable for human life. The scale and timing of irreversible tipping points being passed is not definitively known. Unless however, an urgent and radical change in the direction of human activities occurs, certainly within less than a decade, wide scale catastrophe is certain. How can we stop this?

There has been an absence of critically informed debate about whether the current solutions proposed by international institutions (market, technical or biofuels) will work. The thesis begins by critically examining these, arguing that the dominant political economy framework in which they are embedded, precludes real and effective alternatives.

Through the prism of the South African coal and electricity sectors, the thesis is able to demonstrate some key issues relevant to global warming, such as class, power, accumulation and the metabolic rift. South Africa was chosen as it represents a microcosm of the global capitalist economy. It also reveals the contradictions of being on the front line, both in facing the consequences of global warming and in exacerbating its causes. The coal and electricity sectors provide a snapshot of conflicting class interests, of the power and pervasiveness of the capitalist system and the relevance of these to global warming.

In light of the South African analysis, the thesis argues for the importance of explicit and critical theory as a framework for understanding the world and providing a basis for social change. Critical theory is the dominant framework for political economy. It enables an ecological critique of capitalism, drawing on the historical materialism of Marxism, arguing that the imperatives of capitalism's unrestrained exploitation of the ecology and society are based in the particular social relations of production. These in turn give rise to the

metabolic rift, global warming and a myriad of other symptoms of the crises of capitalism.

It is argued that the problems of global warming cannot be solved through capitalism. This means different economic structures will need to be established. The thesis concludes by setting out the principles upon which to build future societies. These are based within the constraints of first, humans' physical needs for survival; second, the biosphere's capabilities; and third, the harmonious and restorative relations between humans and nature. While the purpose is not to provide a comprehensive blueprint for the future, the thesis also provides examples of where some of these principles are found currently and of where transformative changes have taken place.

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Acronyms

AAP Australian Associated Press

AGC African Global Capital

AIDC Alternate Information and Development Centre

AMD Acid Mine Drainage

ANC African National Congress

AsgiSA Accelerated and Shared Growth Initiative of South Africa

ASPO Association for the Study of Peak Oil

AU African Union

BBC British Broadcasting Corporation

BEE Black Economic Empowerment

CCS carbon capture and storage

CDM Clean Development Mechanism

CER certified emissions reduction

CFC Chlorofluorocarbons

CMH Commission on Macroeconomics of Health

CoAL Coal of Africa

COSATU Council of the South African Trade Unions

CTL Coal to Liquids

DE Department of the Environment

DEAT Department of Environment and Tourism

DME Department of Minerals and Energy

DMR Department of Minerals and Resources

DRC Democratic Republic of the Congo

EIA Environmental Impact Assessment

EIA Energy Information Administration (U.S.)

EROEI energy return on energy invested

ETS Emissions Trading Scheme

EU European Union

FAO Food and Agriculture Organisation

FOE Friends of the Earth

GEAR Growth, Employment and Redistribution

GFC Global Financial Crisis

GHG greenhouse gas

GM genetically modified

GNI Gross National Income

HDI Human Development Index

HFC hydrofluorocarbon

IIED International Institute for Environment and Development

IMF International Monetary Fund

IPCC Intergovernmental Panel on Climate Change

IRP2 integrated resource plan

ISCOR South African Iron and Steel Corporation

JI Joint Implementation

MDG Millennium Development Goal

MEC Mineral Energy Complex

MIDGETT Mining Industry Growth, Development and Employment Task Team

MPRDA Minerals and Petroleum Resources Development Act

MW mega watts

NASA National Aeronautics and Space Administration

NEMA National Environmental Management Act

NEPAD New Partnership for African Development

NERSA National Energy Regulation of South Africa

NOMR New Order Mining Right

NUM National Union of Mineworkers

OCGT Open Cycle Gas turbine

ODMWA Occupational Diseases in Mines Work Act

OECD Organisation for Economic Cooperation and Development

PACJA Pan African Climate Justice Alliance

PBMR Pebble Bed Modular Reactor

PFC perfluorocarbon

PHM People's Health Movement

ppm parts per million

PPP Purchasing Power Parity

RDP Reconstruction and Development Programme

REDD Reducing Emissions from Deforestation and Forest Degradation

SADC Southern Africa Development Community

SAFCEI South African Faith Communities and Environment Institute

SANParks South African National Parks

SAP structural adjustment programme

SASOL South African Coal, Oil and Gas Corporation (in Afrikaans)

SBS State Broadcasting Service

TFCA Trans-frontier Conservation Area

THC thermohaline circulation

TRIPS trade related aspects of intellectual property rights

UNEP United Nations Environment Programme

UNESCO United Nations Educational, Scientific and Cultural Organisation

UNFCCC United Nations Framework for Climate Change

UNFPA United Nations Population Fund

WCED World Commission on Environment and Development

WHO World Health Organisation

WMO World Meteorological Organisation

WTO World Trade Organisation

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PART I INTRODUCTION AND GLOBAL WARMING

Chapter 1 Introduction

1.1 Introduction to thesis

There is no longer any doubt that human induced global warming is occurring. What is not known is the timing and magnitude of effects and at what point irreversible tipping points will be passed, taking the planet on a warming trajectory which will be catastrophic for humans and most species. It is the greatest issue facing humanity. The key points in the evidence of its existence are presented but this thesis is not about global warming *per se*. It is about the political economy of global warming. To be more accurate, I have recognised in the thesis it is necessary to see global warming as one of a suite of problems arising from the globalised capitalist system.

The term ‘political economy’ requires immediate definition. It has been chosen because it involves an insightful approach to understanding society – particularly in relation to power, class and ‘the social relations of production’ (see below) which are issues of particular concern in analysing the structural dynamics relevant to global warming. Weingast and Wittman (2006: 3) summarise the range of interpretations of political economy as follows:

For Adam Smith, political economy was the science of managing a nation’s resources so as to generate wealth. For Marx, it was how the ownership of the means of production influenced historical processes. For much of the twentieth century, the phrase political economy ... had contradictory meanings. Sometimes it was viewed as an area of study (the interrelationship between economics and politics) while at other times, it was viewed as a methodological approach. Even the methodological approach was divided into two parts – the economic approach (often called public choice) emphasising individual rationality and the sociological approach where the level of analysis tended to be institutional.

For this thesis, I have drawn on the definition from Munro (2004: 146-7):

Political economy is firstly a study of *society* and *social processes*. It focuses on ‘material production’ in two senses: (i) how the creation, distribution, exchange and consumption of goods, services, income and wealth occurs, and (ii) how the organisation and imperatives of material production influence almost all of society’s other institutions, be they political, civil or cultural. Second [political economy] has analysed the nature of economic *growth* and *change* and how the prior distribution of resources (such as land, labour and capital, and the conflict between the respective classes) affects economic change. Third [political economy] is a *social science* both in terms of its social content (the study of how people, classes, social systems, institutions, gender, etc. produce and reproduce the material bases of societies), its use of scientific methodologies (whether empirical, historical materialist, deductive, etc.) and its self-reflexive and self-critical nature. Fourth, the values inherent in political economy reflect its status as a child of the Enlightenment. Finally, the founders of political economy were *political activists* who saw government as a fundamental (if flawed) buttress of the economy.

Ballaam and Veseth (2005: 5) add some points which are relevant to the use of the term in this thesis. In this, political economy is ‘necessarily international in context’ and looks at the ways that ‘individuals, states, and markets of the world are connected to one another and the arrangements or structures that have evolved to connect them [reflecting] culture, history and values’. It involves explicit analysis of power structures and an understanding of the power of ideology.

There is no pretence in the philosophical neutrality of political economy. This thesis will be drawing on Marxist theory (which fits well within the critical political economy approach) to take a critical and analytical approach to the structures underpinning global warming and the neoliberal solutions to this problem. For this thesis, political economy has considerable relevance in

addressing the practical problem of global warming, situating it not as the central problem - albeit one that requires immediate attention - but a historical and material symptom of a political and economic system that is in crisis. The thesis draws on the methodology of political economy and critical theory (discussed in more detail below) to examine both the causes of and the possible solutions to global warming. The defence of such a methodology, if defence is needed, is that the debate about the causes of and solutions to global warming is strangely de-contextualised from broader social, economic and ecological crises, and largely 'a-theoretical'.

It must also be recognised that that debate has to be political. This is where the political economy of global warming, while drawing on environmentalism, at the same time has to challenge that body of knowledge. It is a point made by Rosewarne (2002: 180): 'if the engagement of political economy with environmentalism is to be one of substance, it must be more than an intellectual excursion through competing paradigms. The intellectual task must also have a political edge to it so that it engages with environmentalism politically.' In terms of the road travelled by this thesis, as it turns out, it is very much guided by what Rosewarne (2002: 181) then adds: 'A political economy of the environment [and I would add global warming] should look towards identifying and critically engaging with the social forces that can create the transformation necessary for effecting a sustainable future.' Part IV of the thesis seeks to do just that.

A second key concept for the thesis is the 'social relations of production'. I am using this in a Marxist sense. Marx (1894: np) wrote:

The specific economic form, in which unpaid surplus-labour is pumped out of direct producers, determines the relationship of rulers and ruled, as it grows directly out of production itself and, in turn, reacts upon it as a determining element. Upon this, however, is founded the entire formation of the economic community which grows up out of the production relations themselves, thereby simultaneously its specific political form. It is always the direct relationship of the owners of the conditions of

production to the direct producers — a relation always naturally corresponding to a definite stage in the development of the methods of labour and thereby its social productivity — which reveals the innermost secret, the hidden basis of the entire social structure and with it the political form of the relation of sovereignty and dependence, in short, the corresponding specific form of the state.

Further, on the social relations of production, Marx (1847: 207) wrote that the ‘relations of production in their totality constitute what is called the social relations, society, and, moreover, a society at a definite stage of historical development, a society with peculiar, distinctive characteristics.

In other words, humans’ impact on the environment is determined by the particular social structure of the society, the social relations amongst people and the material/social relations of people with the broad ecology. Within the capitalist social structure, the ecological conditions of social reproduction have been largely ignored with the natural environment being treated as a free and limitless resource for the economy, until more recent decades when various ecological crises have forced a reassessment. A political economy approach is based on the centrality of the social relations of production; it takes into account the class structure of society, as well as exploitation – of humans and nature - and hence social or class conflicts. It also takes into account the role of institutions, including the state as a political institution, recognising the inseparable relationship between institutions and power relations.

The Marxist political economy approach is methodologically, theoretically and historically useful in answering the question: ‘can capitalism solve the problem of global warming?’

Turning to the empirical part of the thesis, the idea of focusing on South Africa was primarily because of the need to think through from an empirical base how best to establish a theory of political economy for examining global warming. Setting off initially with a view of global warming as ‘the’ focus of the thesis, two things happened. First the examination of South Africa in the context of

global warming led me to recognise that seeking to build the thesis on some compartmentalised view of that phenomenon would be inadequate. The problem of global warming is one of a suite of problems which the capitalist system throws up. It follows that the scope of the thesis then had to expand to encompass this idea, while still keeping global warming central. In particular the analysis of the political economy of South Africa as set out in Part II of the thesis allowed me to see how to build the theory in Part III. Indeed the original intention (which is more common in doctoral theses) of the empirical case study following the theory was jettisoned. The study of South Africa is better seen and is now labelled as not a case study but as a microcosm of the global economy. That insight and the subsequent rearrangement of both my thinking and the layout of the thesis were stimulated by the comment from Amin (1997 np) that South Africa is ‘a kind of microcosm of the world capitalist system’. That is, South Africa captures and reflects the global social relations of production, exemplifying the ecologically exploitative and destructive nature of the capitalist political economy.

The fact that South Africa can be seen as a microcosm of the global political economy, including the global class divisions, makes it a fertile context for the theory in Part III. The position of South Africa in the history of capital accumulation and the contradictions raised by global warming for South Africa provide pointers to the theory in Part III and for seeking alternative social relations of production in Part IV. South Africa is run on neoliberal economic policies; it has enormous poverty and on some reckonings is the most unequal society on the planet; it exhibits the symptoms of the classic Marxist ‘metabolic rift’ - that is, the rift between the ecological and economic reproductive dimensions of society. South Africa demonstrates the traits of alienation in various forms; it reveals in various ways both the imperative and the expansion of capital accumulation and growth (and a failure of trickle down); it exemplifies the way that financialisation occurs and how that exacerbates not only inequality and class divisions but also global warming; it demonstrates the convergence of interests of the global elites; it provides a good example of the contradictory influences of international institutions and the capitalist model of development, particularly in the context of global

warming; and, by focussing in Part II of the thesis on fossil fuels and South Africa, illustrates the lack of motivation on the part of the national government and of global institutions such as the World Bank when driven by the edicts of neoliberalism to address the problems of global warming. It in turn highlights that the poor are already, and will continue to be, the first and worst affected from the impacts of global warming, and yet are those least responsible for its causes.

The thesis thus casts a wide net to catch a large number of issues relevant to the political economy of global warming, particularly issues such as the continuance of poverty and inequality – for global warming, poverty and inequality are all rooted in the same inequitable global power structures, in the same social relations of production. The complex, multi-factorial nature of global political economy enables these connections to be made, connections which are essential if solutions to global warming are to be found.

1.2 Objectives and methods

The main research question is: can capitalism solve the problem of global warming?

There are six sub-objectives to this thesis. They are:

1. To summarise what the science is saying about global warming and the health of the biosphere
2. To place the discussion of global warming into a critical theoretical context, emphasising the importance of the distinction between critical theory and positivism.
3. To document and outline some of the key criticisms of neoliberal solutions to global warming.
4. To present a microcosm of the globalised capitalist system from the perspective of political economy. The microcosm selected is South Africa.
5. To provide a Marxist theoretical framework for criticism of aspects of capitalism selected for their relevance to global warming.
6. To develop alternative core social, political and economic principles compatible with a diversity of just and sustainable futures.

1. The thesis draws on peer reviewed scientific literature to give an outline of what the science is saying about the unequivocal fact of global warming.
2. For the second objective of placing the discussion of global warming into a critical theoretical context, the thesis makes the distinction between critical theory and positivism and it is in the methodology section that this objective is first and foremost located. It is argued that the distinction between positivist and critical theory is particularly important in relation to issues such as global warming for someone writing from the 'West' which is dominated by positivist a-theoretical analyses of and responses to global warming.
3. For the third objective, there is a brief summary of what the science is saying about global warming, contextualising this within the inseparable wider framework of the general health of the biosphere. My method of enquiry (for this and the next two objectives) involves researching a wide range of secondary sources of global warming literature from a broad group of disciplines. With this objective, in addition to the Intergovernmental Panel on Climate Change (IPCC) reports, I have drawn on work by the Stockholm Resilience Centre¹, which has brought together international scientific research on a broad range of ecological issues and which constructs a picture of the biosphere's 'planetary boundaries'. Additionally, I have used global data from publications such as the World Bank's *World Development Indicators 2010*; and ecological footprint data from the Global Footprint Network (2010) and from the *United Nations' Human Development Index 2010*.

By situating the science of global warming in the context of the general health of the planet, I have consolidated the argument of why neoliberal, deductive, single-issue conceptualisations and solutions - be they a carbon tax, carbon emissions trading schemes, renewable energies, biofuels or carbon

¹ I was first alerted to the work of the Stockholm Resilience Centre by Foster et al's 2010 book, *The Ecological Rift*.

sequestration - will not solve and may even exacerbate the problem of global warming. A wider biospheric context for global warming is provided which identifies the imperative of conceptualising global warming as but one of a suite of urgent and interrelated crises.

Building on the argument of whether capitalism can solve the problem of global warming, the third objective documents neoliberal solutions to global warming and then outlines some of the key criticisms of these solutions. This is important groundwork for the development of the arguments around whether capitalism can solve the problem of global warming. I have based this section on a selection of reports in the literature, including Oxfam (2008), the FAO and IIED 2008 report, *Fueling Exclusion?* (Cotula and Dyer, *et al.* 2008) and Friends of the Earth's (FOE 2010) reports on biofuels and Lohmann's (2007) *Carbon Trading: A Critical Conversation on Climate Change, Privatisation and Power*; Friends of the Earth's *A Dangerous Obsession* (FOE 2009) and *Subprime Carbon? Re-thinking the world's largest new derivatives market* (FOE 2009a).

Objectives two and three which are based on secondary sources are integral to the progression of the thesis argument.

4. Presenting a microcosm of the globalised capitalist system from the perspective of political economy for objective four enables a picture of how capitalism is expanding on the continent of Africa. This presages global warming catastrophe for that continent. The microcosm selected is South Africa. I have drawn on a range of political economy and history literature, publications and South African media – as well as spending three months each year for the past three years in South Africa, attending township activist meetings, university forums and lectures, touring the countryside and visiting coal mines, working in a voluntary capacity with refugees, picking up labourers hitching the long distances to and from their work and meeting people involved in issues of social justice and environmental issues. In this sense, in terms of the methods of research adopted, the thesis is multi-disciplinary and multi genre.

South Africa is not so much a case study as a vignette of capitalism, selected as it captures many of the globally destructive mechanisms and contradictions of the capitalist system, including several particularly relevant to global warming. South Africa is a country which was brought into the capitalist system through the colonial era and is now an agent in spreading that particular system throughout Africa. It is a country which illustrates deep class divisions, the divisions between the benefits and burdens of capitalism which will be magnified as a direct consequence of global warming. South Africa provides an example of the history and continuing development of a rift both between humans and between humans and the broad ecology. It thus captures the essence of what Marx termed the 'metabolic rift' which is a concept central to the theoretical underpinnings of the thesis.

5. Objective five seeks to provide a Marxist theoretical framework for criticism of aspects of capitalism selected for their relevance to global warming. It is based upon and guided by the key components emerging from the study of the microcosm that is South Africa. It constitutes the theoretical core starting with an overview of contemporary Marxist ecological literature guided by the South African empirical material and key points in that country's economy relevant to global warming. The theory is selected for its expose of key concepts relevant to global warming from a Marxist perspective: the metabolic rift and specifically the carbon rift and its historical, material and social roots; alienation – of humans from the broad ecology (of which humans are a part); capital accumulation and the financialisation of capital – and their relevance to global warming. These provide the scope for an understanding of the causal and compounding basis of global warming and the inextricably related and various crises of capitalism.

6. The final objective of the thesis is to develop alternative core social, political and economic principles compatible with a diversity of just and sustainable futures. For this objective, I use some historical examples of transformative change and base the core principles being proposed for future

sustainable societies in large part on a response to the Marxist criticism of contemporary unsustainable capitalist society.

1.2 Methodology

The thesis is centrally concerned with methodology, that is, the theoretical and conceptual framework for setting the thesis' principal question 'can capitalism solve the problem of global warming?' I deliberately set this as the thesis question because the capitalist hegemonic ideology precludes such a question being asked by the dominant (national and international) governance and research institutions in finding solutions to global warming. 'Global warming' is a subject of such profound consequence and importance - intersecting with all other aspects of human society; it is an equity and justice issue; an issue which illustrates urgently and graphically the chasm between the economics of globalised society and the survival of humanity; the chasm between the rich and powerful and the poor and powerless. Methodologically, it is a subject which illustrates the distinction between positivist and critical theory and so the over-riding methodological approach relates to the first objective of the thesis: to place the discussion of global warming into a critical theoretical framework. It is to the significance and centrality of critical methodology and theory that I now turn because this is at the very crux of why real solutions to global warming necessarily represent a fundamental challenge to the political, economic and ideological *status quo*.

It is particularly important to establish the significance of Marxist critical theory in discussing such a complex and ideologically-anchored issue as global warming as this phenomenon is increasingly being conceptualised in normative terms as no more than a market failure requiring market (including technical) neoliberal solutions.

The reasons for the emphasis placed on methodology and theory in this thesis is that much of the global warming debate is contextualised within the global neoliberal capitalist framework which is so hegemonic that it presents the world as if it is 'how it is', the one and only reality and possibility for human

development. Theory provides frameworks for interpreting and making sense of the world. Particularly for many researchers and academics in the West, who are deeply ensconced in and/or are beholden to the institutions and ideology of capitalism, a critique of the system and its theoretical underpinnings is essential groundwork for understanding this aspect of what has been called the 'crisis of civilisation'.² This is seen as essential before we can begin to construct alternative paradigms. Critical theory provides the methodology, framework and analysis for a more detached view of contemporary society, its political economy structures, power relationships, institutions and epistemologies.

Western epistemology includes two broad schools of theory – positivism and critical theory. The positivist school was born of the work of early nineteenth century French philosopher, Auguste Comte (Zalta 2010) who developed a secular approach to knowing the world around reason and logic and the notion that sense perceptions are the only credible basis of human knowledge and meaningful thought. Positivism attempts to equate the understanding of social reality with the scientific explanation, prediction and control of natural reality as practised by the hard sciences of chemistry, physics and biology. Social and natural realities are conceived by the positivists as objectively quantifiable and measurable. What appears on the surface is conceived as the full extent of reality. Juxtaposed to this is critical theory which involves an approach to knowledge that questions interpretations of the world, particularly in relation to the political or power dimensions of society and our lives as socialised beings. The central tenet of critical theory is that all knowledge is historically contextualised and political in nature. Thus critical theorists contend that knowledge is shaped by a society's institutions, its culture, its underlying political economy structures and its interests.

It was only in the early philosophical manuscripts of Karl Marx that a critical theory of society first emerged. It did so against the background of the class

² This term is from the Alternate Information and Development Centre (AIDC) Crisis of Civilisation Conference in South Africa in October 2010.

struggles and social revolutions which were occurring in Europe in the middle of the 19th century when class antagonisms between workers and capitalists intensified. At this time, workers encountered conditions of profound exploitation and inadequate wages to meet their survival needs – a factor in providing the fertile ground for the development of critical thinking about society and its social relationships as a whole. Critical theory is the dominant framework within political economy.

Certainly theories of history and the notion of *telos* or goals of human society existed long before Marx, for example, going back to the time of Plato. However prior to the advent of critical theory, critiques of society had been essentially of the state and the laws of the state. What Marx did was to develop a critical and social theory based on the alienating relations of humans in capitalist society. Thus in his early work, Marx (1963) was concerned with the release of humanity from the alienating and exploitative relations of production. Marx considered that the whole society was alienated from the human actors who produced and reproduced it and was therefore beyond the control of the very human beings who made up the society. This contrasted with the positivist schools that saw society in a-historical terms and simply as a description of its component observable parts.

Subsequent Marxists, such as Marcuse (1964), explained the central importance of critical theory in a way that brings out its relevance to issues such as global warming today. He proposed that truth lay in the attempt to go beyond what appeared as reality by critiquing that apparent reality, while committing to attempt to change the world into a better place – a world beyond injustice, racism, inequality, wars and so on. In this framework, critical analysis is seen as useful in trying to make the world a more humane place in which to live.

The political significance in the difference between these two approaches can be practically illustrated by, for example, the facts of the United Nations Millennium Development Goals (MDGs). These read like a wish list. For

example, one MDG is to halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day. This is a neatly positivist approach to tackling poverty and inequality. It is a-historical. It describes but leaves unattended the structural and historical causes of such phenomena.

Criticism of the MDGs is voiced by Navarro (2002: 473) at a more general level when he writes that the 'international agencies are masters of depoliticising what is profoundly political'. A critical theoretical approach to poverty and inequality would seek to understand their institutional and historical causes, thereby providing a basis for changing the structural and institutional bases. Critical theory presents 'facts' and 'reality' as the historical products of humans with the aim that humans become conscious of their social products (Kirkpatrick, *et al.* 1978) and therefore more able to change them. Critical theory enables us to analyse and understand how particular ideologies serve particular social classes and how this is tied to concepts of power and hegemony. As Escobar (1995) has shown, development institutions from the World Bank down create knowledge within the confines of the positivist framework.

While the establishment's responses to global warming are not only inadequate but an extension of the climate change denialism supported by the right, critical theory challenges this *status quo*. This is particularly important at this historic juncture when humans are facing the brink of survival. It is essential we turn to critical theory first to interpret and then to change this world.

Critical theory and critical research focus on the need and potential for transformative social change which empowers the marginalised, oppressed and exploited. It provides the tools for example, for building critical democracy (Fiske 1993), and critically conscientising subjects rather than providing a 'banking' education for consumers of education (Freire 1970).

Gramsci's (1971) notion of hegemony is central to critical theory and research. He argued that the dominant powers of the 20th Century were not exercised just by physical force – although that too – but by complex socio-cultural and

economic factors and institutions such as schools, the media and churches. Universities, once the site of more critical reflection and discourse, have increasingly been brought into this hegemonic milieu with, on the one hand, increasing dependence on corporate sponsorships and, on the other, university 'outputs' being quantified and streamlined to meet the needs of the economic system. One institution that has come to the fore, perhaps above all others in creating the dominant ideology in the Gramscian sense, is the institution of the market. Polanyi (1944) wrote before the era of neoliberalism of the irrationality and ideological nature of market liberalism. As a central and dominant institution of capitalism, the market acts as an agent in the reproduction of capitalism, with people - individuals - being reduced to consumers and where, as Margaret Thatcher infamously claimed, there is no such thing as society. This is the 'Washington consensus' model (Williamson 1990), the neoliberalised capitalism which creates an economic order in which the market mechanism largely determines the fate of human beings and the environment, resulting in the devaluing of, or even disintegration of society. Market solutions to global warming are an example of the irrational and ideologically-captured framework which dominates the global warming 'debate' and which can destroy society. Crucially, critical theory questions the assumptions captured by this dominant system and its hegemonic ideology and hence, critical theory provides the over-arching framework for political economy.

Critical theory for example questions assumptions such that 'the Australian way of life' (or the US's or Western European countries' way of life) is at the apex of a human development trajectory and 'non-negotiable'. It questions that such countries are un-problematically democratic models for the rest of the world to follow (Kincheloe and McLaren 2002). Critical theory is concerned with the principles of justice, issues of power, ideology, class, oppression and exploitation, of how the world developed historically to the point reached today, where the richest 10 per cent control 85 per cent of global wealth while the poorest 50 per cent own only 1 per cent (World Bank 2010); where the damage from human activities to the environment has become so great as to threaten the survival of all human and other species. Importantly, critical

theory is not just concerned with abstract academic research but focuses on the need, potential, tools and processes for transformative social change, led by those who have been critically conscientised, empowering the marginalised. It seeks to enable the building of a diversity of societies and cultures that are enduring and in harmony with the biosphere.

Thus the role critical theory to this thesis is to make the theoretical approach used here politically explicit - a clear statement of my overtly political approach. Global warming is not an isolated problem to be solved through technical or market solutions, arising from the same alienating social relations of production as 'the problem'. It comes from a particular system of political economy, with particular, unequal power relationships that are integral to the system, from particular modes of production and consumption, from particular industrial technologies, from particular relationships between the market and science and technology and from the marketisation of the broad ecology – including humans.

As explained earlier, it was in first describing and then analysing the South African economy that I came to realise the signally important usefulness in juxtaposing critical theory alongside positivism in seeking to examine both the causes of and solutions to global warming. That realisation also brought me to appreciate two other issues that turn out to be central to the thesis: that global warming is one of a suite of problems arising from capitalism; and that the source of both denialism of and the proposed market solutions to global warming are embedded in positivist neoliberal ideology. While the focus remains global warming, the study of South Africa pushed me to mount a wider theoretical and conceptual analysis than I had originally intended.

Clearly the dominant neoliberal paradigm fits into the positivist school. It has been moulded by Western institutions which have played a causal role in the climate crisis. These are both hegemonic and weighted in favour of the interests of the global power elite. This positivist view presents itself as an incontrovertible fact which is independent, final and unchallengeable. It simply is. Mullard (2004: 87) notes that in most discussions of globalisation, the

market economy and neo-liberalism are presented devoid of ideology and questions of power. There is an absence of questioning. It represents ‘a surrender to what is seen as the implacable and irreversible logic of social reality. It is a project in which market liberal ideas have a life of their own – difficult to challenge and difficult to dislodge’ (Mullard 2004: 107). He continues: ‘Most [market] economists think ideology has no role in their thinking. Market liberalism is presented as the only viable alternative that can protect individual rights and democracy is linked to free markets as if the two were inextricable’ (Mullard 2004: 107). There is no discussion of an alternative because there is no need for such a discussion. Neoliberalism is the ideological summit (Fukuyama 1992). There is nowhere better to go - although there is no end to the trajectory of progress and development, growth and consumption and hence ecological destruction.

This positivist, neoliberal worldview hides the fact that issues such as global warming and solutions such as carbon trading are political in nature. The positivist approach springs from the theoretical paradigm that underpins the *status quo* and, in doing so, prevents the emergence of real solutions to the complex problems of our global society, including global warming. It breeds and feeds both the extreme form of denialism that fails to acknowledge that global warming is happening, as well as a more general malaise of denialism in which there is refusal to address the systemic causes of global warming. Both create barriers to a questioning of the development trajectory that has given rise to it in the global institutions charged with addressing the problem and in public discourse more generally. The general malaise is perhaps the more dangerous because it is so deep and pervasive and hence unseen, and diverts from the possibility of addressing the systemic causes of global warming. It results in protecting the capitalist system rather than the biosphere. The neo-liberal conceptualisation of global warming frames it as a single, separate, economic and technical issue – an issue which can be fixed by market and technological mechanisms.

It is further argued here that adopting a particular perspective of history matters. In the context of this thesis, the Marxist historical account of the

development of capitalism is critical to an understanding of the political economy of global warming. This is for three inter-related reasons. First, to understand the inseparable dichotomy between accumulation and dispossession and to address this division so there can be justice for all impoverished peoples around ecological debt³ - a prerequisite to any solution to global warming; second, as a basis for understanding and changing the systemic structural underpinnings of global warming; and third, to enable the development of new political economy structures which avoid the pitfalls of capitalism. One can only understand the causes of global warming by critiquing and understanding the political economy of global warming. Only then can one begin to build alternatives which address the causes of global warming and not just selective symptoms.

There is a need however to be wary of another form of exploitation and alienation, that of adopting a wholly western philosophical basis for this discussion. While Marx saw the superstructure of society, which arises from the economic sub-structure, as containing the cultural aspects of society, he did not develop the concept of cultures and cultural diversity – omissions this thesis touches on here and returns to again in Part IV because of their importance to future societies.

Connell (2007) argues that mainstream social science has long conceptualised the world in terms formulated by the educated and affluent in Europe and North America, using the majority world as a data mine. She seeks to include recognition of the historical consequences of the global expansion and domination by the West, in particular in relations to authority, exclusion and inclusion, and the hegemony by the metropolis over the periphery. Furthermore, she argues that theories that build only on the experience of the most privileged 600 million people, and use it to explain the world for the whole 6,000 million, lack credence (Connell 2007).

³ The idea of ecological debt is not new, dating back at least 200 years. In modern times however its contemporary meaning is most frequently ascribed to Accion Ecologica Ecuador: 'the debt accumulated by Northern, industrial countries toward Third World countries on account of resource plundering, environmental space to deposit wastes, such as greenhouse gases, from the industrial countries' (Accion Ecologica 2009: np).

Connell (2007: 213) contends that theory needs to recognise the ‘dynamism of the periphery’ and to find a way of ‘connecting the different formations of knowledge in the periphery with each other’. Ideally, it is recognised that there is a need to redress the dominance of Western epistemology and ideology, by acknowledging and drawing on the theories, experiences and perspectives of the majority, marginalised world, what Connell calls ‘Southern theory’, in constructing stories about the world. It has been beyond the scope of this thesis to do so. However, as the thesis draws on South Africa as a microcosm of the global economy, I have used some of the African and South African scholarship and literature to form my arguments. I readily acknowledge however that the overall thrust of the thesis remains Western in its epistemology. To do adequate justice to ‘Southern theory’ would require another thesis.

Before leaving the views of the majority world, it is however worth turning to Indian writer and scholar, Nandy (1987: 22), who argues that oppressed people and cultures, in resisting oppression, have to have some resistance to modernity and to the ‘connotative meanings of concepts such as development, growth, science and technology, history and revolution’. Such concepts, he suggests, are a new form of ‘the state’ and can represent a form of violence and injustice. Nandy believes the theories of the oppressed must also encompass the connections between cultural survival and the global structures of oppression and the West.

For the majority who live outside the experience and hegemony of Western ideology and the material lives of Western industrial society, there is inevitably a very diverse and different worldview of global warming. This is not given the status of theory in industrialised societies’ arenas of scholarship. It is shaped by non-industrial/non-scientific modes of subsistence and the very intimacy and interconnectedness of the relationship between humans and their environment. This relationship has been expressed by many Indigenous people. In one (of what could be many), it is captured by the words of Australian Aboriginal Mick Dodson (1997, quoted in Connell 2007: 195).

Everything about Aboriginal society is inextricably interwoven with, and connected to, the land. Culture is the land, the land and spirituality of aboriginal people, our cultural beliefs or reason for existence is the land. You take that away and you take away our reason for existence. We have grown the land up. We are dancing, singing and painting for the land. We are celebrating the land. Removed from our lands, we are literally removed from ourselves.

Thus in examining the purpose of theory for this thesis, it is important to recognise that the concepts used in the development of theory (Middleton and O'Keefe 2001: 20):

operate within linguistic structures, sets of meanings, which are largely formed by the society in which it is held - the dominant values of society are embodied in the linguistic and structural assumptions by which discourse proceeds. Where the exchange is between classes or between rich and poor states, the most powerful parties will do their utmost to ensure that it is their language, their values, which are seen as 'natural', as possessing 'sense' and as being obviously 'right'.

At the heart of Western material and ideological dominance are science and technology. These have come to dominate the social relations of production, and the ideology of progress. They however are not politically, socially or economically neutral. Nandy (1987) critiques the culture of science on the basis of its isolating mechanism, the psychological separation of cognition from affect. He writes (Nandy 1987: 50) that the culture of the West was defined by a contractual, competitive individualism and that an 'utter loneliness flowed from this'. He links the entwinement of science and powerful technologies with the interests of the state and ruling elites, arguing that science has become a key to the dominant ideology of the postcolonial state, legitimising the violence that is done in the name of economic development.

It is thus necessary to draw attention to the role science plays in rational, industrialised society and in the justifications for Western ways of constructing frameworks, conceptualising and changing the world. The predominance of science, and the inseparableness of science from the economy and the state, accord it special attention in discussing the purpose of theory to this thesis. Shiva (1988: 232) writes: ‘The nexus between modern science and violence is obvious from the fact that eighty per cent of all scientific research is devoted to the war industry’.

Shiva (1988: 232) continues that the reductionist nature of science supports an economic structure ‘based on exploitation, profit maximisation and capital accumulation’. In similar vein, Illich (1981) labelled industrialised economic development that is based on science and technology, a war activity. Shiva (1988: 233) proposes that the global, multidimensional ecological crisis is an ‘eloquent testimony to the violence that reductionist science perpetrates on nature’. It is the sum total of all of these parts of the capitalist system which are in need of deep and critical analysis. The purpose of theory in this thesis is thus to enable us to see better and at a deeper level where this coming together of the state, the corporation, and the capitalist relations of production, is leading humanity – and to help to see a way to build a different future.

While recognising the importance of the diversity of epistemologies to the future of humanity, I will draw on particular aspects of a Marxist theoretical framework to shed critical light on the historical, structural and systemic causes of global warming. I have turned to Marxism as it provides a historical, materialist and critical analytical framework to the understanding of history and contemporary society – a framework that goes beyond the limitations of a positivist, descriptive approach to issues such as global warming. It enables us to break through ‘established reality’ (Marcuse 1964: 80). Additionally, as Marcuse (1967) argues, for the rich in Western society ‘it appears crazy at first to want a revolution for we have whatever we want.’ But he adds that the aim is ‘to transform the will itself so that people no longer want what they now want’ (Marcuse 1967 np). This was written over 40 years ago when Marcuse almost certainly would not have been thinking of global warming but this idea

of the need to ‘transform the will’ is echoed in the thesis in seeking to create a conceptual framework that gives us hope that there are alternatives to the capitalist system which is destroying the planet. Critical theory and methodology provide the tools to build that conceptual framework.

1.3 A map of the thesis

The thesis is divided into four parts. Part I consists of three chapters. Chapter 1 includes the introduction, an overview of the literature, the methodology used and definitions of political economy. Global warming evidence and projections are covered in Chapter 2, placing both in the wider context of social and ecological problems confronting the planet in general. Chapter 3 outlines and evaluates international institutional responses to global warming: the Kyoto Protocol, emissions trading schemes, biofuels and technologies – both renewable technologies and technologies such as carbon capture and storage.

Part II, the study of South Africa as a ‘microcosm’ of the global economy, is divided into 5 chapters, covering the African context of South Africa and its ecology, history and political economy, before turning to a particular slice of South Africa’s economy - the coal and electricity sectors. The study includes details and discussion about a recent World Bank loan supporting expansion of the coal/electricity sectors, before concluding with discussion and analysis of the study in relation to the political economy of global warming.

Using the methodologies of critical theory and of political economy in the ‘global microcosm’ of South Africa, Part II builds to the theoretical section of the thesis in Part III. This draws on Marxist ecological theory for a critical analysis of the political economy of global warming, bringing to the fore issues of class, power, inequality, alienation, financialisation and the rift between humans and nature. This in turn allows a critique of the current economic system and the intellectual basis for building an alternative and sustainable future.

Part IV is my contribution to the political economy of global warming. It provides a platform for bringing this together as it has been developing throughout the thesis. More specifically it presents ‘the way forward’, arguing that alternative models of human development that address the contradictions of capitalism, including global warming, are both necessary and possible. This section does not provide a blueprint for future societies, but rather key principles which not only address many of the major contradictions of capitalism, but would enable a flourishing of a diversity of societies that are enduring, resilient, just and equitable.

Each part of the thesis is distinct. There is however, a common thread running throughout which is that of finding a solution to the most fundamental of human relationships – the social relations of production – and how to live in harmony with the broad ecology, including with our fellow human beings.

CHAPTER 2 Global warming: evidence, causes and predictions

2.1 Introduction

The evidence of human induced global warming is now irrefutable (Hansen *et al.* 2008; IPCC 2007) and humanity is facing, in the near future, a potentially terminal event in geological time, marking the end of the Holocene epoch,⁴ thus destroying the world as we know it (Foster *et al.* 2010). The science is unequivocal: the Earth's biosphere is approaching global warming tipping points which, if passed, will become irreversible, taking the planet on a trajectory to a state unsuitable for human life. The next section presents a brief synopsis of the evidence for global warming. Thereafter section 2.3 gives a brief account of the physiological causes of global warming. An assessment of the future of global warming is presented in 2.4 before section 2.5 concludes.

2.2 The evidence

Global warming refers to the increase in global atmospheric temperatures as a result of increasing concentrations of greenhouse gases in the atmosphere.⁵ Every internationally reputable scientific research institution supports the claim that anthropogenic global warming is occurring. Given that and the very large and increasing volume of research being done on global warming, this thesis does not set out to provide a summary of the literature on the scientific evidence on global warming. The 'fact' of global warming is now largely uncontested, although there remain ideologically driven 'nay-sayers'. Today, questions remain around predictions of timings of tipping points and the scale and timing of widespread catastrophe, with controversies centred more on the conceptualisation and hence solutions to the problem.

⁴ The Holocene refers to the relatively stable geological period of the last 10-12,000 years of the Earth's history, a period during which all human civilisations have developed.

⁵ I use the term 'global warming', rather than 'climate change', throughout the thesis as I think the concept has a less abstract, 'scientised' sense to it.

Certainly the reputability of the research and evidence on global warming remain of the highest importance. The largest and most comprehensive body of evidence to date is in the United Nations' Intergovernmental Panel on Climate Change⁶, (IPCC) Assessment Report - *Climate Change 2007*, the Fourth IPCC Assessment Report. This UN body is widely considered to be the most authoritative source on climate change science, with two provisos. First its data are out of date due to the delay created by the peer-review process and the governments' approval processes – relative to the rapidity of changes to global warming evidence. Second its findings are conservative, again due to the approval process of the reports. There have been four Assessment Reports put out by the IPCC - in 1990, 1995, 2001 and 2007, and most recently, in November 2007 a 'synthesis report' of all the evidence reviewed by the IPCC.

According to Rockstrom *et al.* (2009), in the 2007 IPCC report current climate models may have significantly underestimated the severity of long-term climate change for a given concentration of greenhouse gases. They maintain that most models suggest that a doubling in atmospheric CO₂ concentration will lead to a global temperature rise of about 3°C (with a probable uncertainty range of 2-4.5°C), once the climate has regained equilibrium. However, they argue, these models do not include long-term reinforcing feedback processes that further warm the climate, such as decreases in the surface area of ice cover or changes in the distribution of vegetation. Including these feedbacks would result in a doubling of CO₂ levels and an eventual temperature increase of 6°C (with a probable uncertainty range of 4 -8°C. Such a temperature increase would undermine ecological life support systems and thus human society. (Rockstrom *et al.* 2009).

The strength of the IPCC reports, however, is that, for evidence which has enormous international significance, these publications follow internationally

⁶ The Intergovernmental Panel on Climate Change, based in Geneva Switzerland, was established in 1988 by two United Nations organisations - the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) - to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation.

agreed, strict procedures and involve hundreds of experts and thousands of scientists producing rigorously peer reviewed literature. The author teams reflect a range of views, expertise and geographical representation. Furthermore, each report has to be unanimously approved by 154 governments, including the United States and oil and coal producing countries - a major challenge and one that it would be reasonable to claim would have a conservatising affect on report findings. The latest 2007 report has attracted criticism from leading climatologists themselves, who see it as underestimating the risks of global climate change (Clark and Foster 2007).

Global average temperatures have risen considerably since measurements began in the mid-1800s with the total increase in global surface temperature being estimated at $0.76^{\circ}\text{C} \pm 0.19^{\circ}\text{C}$ (IPCC 2007a). Since 1979, the rate of warming has been about twice as fast over the land as over the ocean. During the last century, the Arctic has warmed at almost twice the global average rate (IPCC 2007a: 237). The warming of the ocean since 1955 has accounted for more than 80 per cent of the increased energy in the earth's climate system (IPCC 2007a: 47). The IPCC (2007b) projects a further increase of 0.4°C in warming during the next two decades. Already, significant geophysical changes are occurring as a result of this temperature increase - from subtropical deserts expanding hundreds of kilometres pole-ward, Arctic sea ice shrinking at an unseasonal and unprecedented rate, species moving pole-ward or to higher ground and mountain glaciers receding - such as in the Himalayas, Andes and Rocky Mountains (glaciers which together provide fresh water for a billion people) (IPCC 2007; Hansen 2005; Hansen *et al.* 2008). It is worth noting that historically, four of five mass extinctions, where it is estimated that at least half of the animal and plant species were wiped out, occurred during periods of warming comparable to those we are facing today (Mayhew *et al.* 2008).

There have been a number of scientific papers published since 2005 predicting 'tipping points' in the global warming process – that is, critical thresholds at which anthropogenic forcing cause small perturbations that can precipitate

large changes – beyond which the warming process is reinforced by positive feedback mechanisms to the point that global warming takes on a momentum independent of human activities (Lenton *et al.* 2008). If it has not already happened, it is now almost certain that within several years we will have set in motion sufficient feedback mechanisms so that humans will be powerless to stop the Earth's change to a new climate, and possibly a new geological era, which will not be conducive to human life. This will bring with it extreme weather events, rising sea levels, increasing droughts, floods and storms of a magnitude not experienced in human history. Hundreds of millions of people will become refugees.⁷

The science states that the safe level of atmospheric carbon dioxide is no more than 350 parts per million (ppm). The level was 280 ppm in pre-industrial times, but had risen to 310 ppm by 1958 when records first started to be kept at Mauna Loa in Hawaii.⁸ The carbon dioxide level in the atmosphere is already 389.69 ppm (December 2010 – See Figure 2.1) and rising increasingly quickly and currently at about 2 ppm per year. The implication of this is that we are no longer at a safe atmospheric carbon emission level and scientists, such as Hansen *et al.* (2008), are arguing there is need to reduce atmospheric carbon levels urgently to 350 ppm, and then more gradually to 300 ppm. A further implication is that we may have already overshoot irreversible tipping points with the Earth's inertia, largely contained in the Earth's oceans, slowing what could be already determined climate catastrophe.

⁷ An example of one tipping point comes from the vast expanse of the western Siberian tundra where permafrost encasing the world's largest frozen peat bog has started melting on a large scale for the first time since it originally formed 11,000 years ago at the end of the last ice age. If this thaws, billions of tons of methane would be released into the atmosphere, and methane, in terms of its impact on global warming, is 20 times more potent than CO₂ (Sample 2005). Other potential tipping points include the collapse of the Atlantic thermohaline circulation (THC), melting of the Greenland ice sheet, the collapse of the West Antarctic Ice Sheet, disturbance of El Nino Southern Oscillation, Indian Summer Monsoon, Sahara/Sahel and West Africa Monsoon; clearing of the Amazon Rainforest and boreal forests (Lenton et al 2008); the acidification of oceans, desertification of land (both reducing the ability for carbon absorption); and melting polar ice caps reducing reflecting surface to deflect the sun's radiation.

⁸ Charles Keeling set up a carbon-dioxide monitoring station on top of Hawaii's Mauna Loa volcano where he could get the cleanest air possible. The data gained from this proved fossil fuels were causing global warming and the 'Keeling Curve', as it came to be known, became what is the cornerstone of global-warming science today.

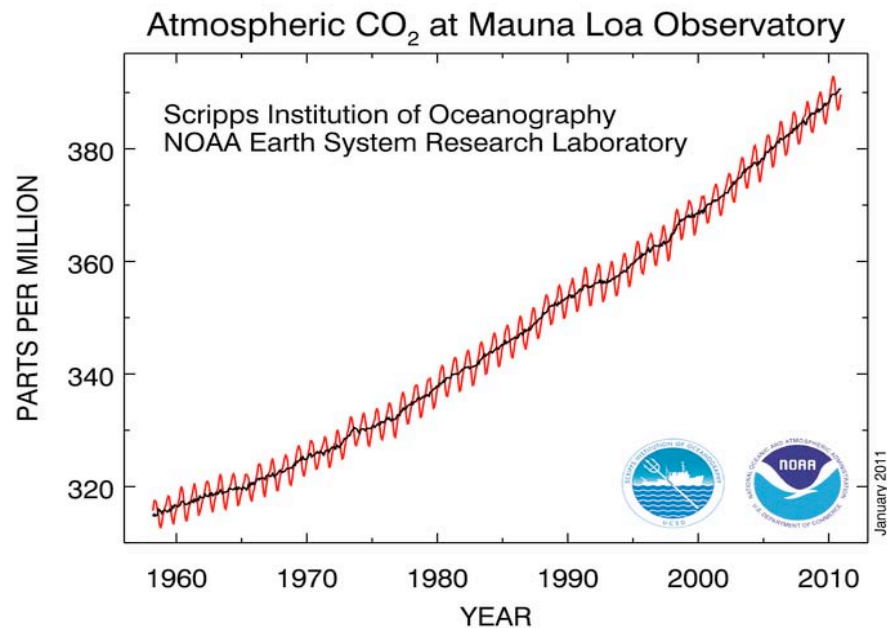
Greenhouse gas emissions in 2010 were reported to have increased to 30.6 gigatonnes (Gt) of carbon dioxide, an increase of 1.6 Gt on the previous year, resulting in the highest carbon emissions in history (Harvey 2011). This emissions trajectory means there is a 50 per cent chance that global average temperature will increase by more than 4° C by 2100 and runaway global warming. While most of the increase comes from China and India, much of the developed world's very small amount of reduction in the trajectory of increasing emissions is due to the dependence on high emissions-producing imports from China (Harvey 2011), and all countries are 'eyeing up extraordinary and risky ways to extract the world's last remaining reserves of fossil fuels' (Harvey 2011: np).

With respect to the oft-stated goal of keeping global warming to less than 2°C, Anderson and Bows (2011) argued that two degrees is a recipe for global disaster. In early 2011, Hansen concluded as a result of new research, that warming of just 0.8°C above the pre-industrial baseline, meant that no 'cushion' is left to avoid dangerous climate change and setting the limit at 2° and CO₂ levels of 450 ppm, were prescriptions for disaster. (Hansen and Sata 2011). Yet few analysts expect average global temperatures to rise less than 2°C, even with 'the most concerted social action' (*Monthly Review* 2004). Anderson and Bows (2011: 21) contend that 'despite high-level statements to the contrary, there is now little to no chance of maintaining the global mean surface temperature at or below [a rise of] 2°C. Moreover, the impacts associated with 2°C have been revised upwards, sufficiently so that 2°C now more appropriately represents the threshold between 'dangerous' and 'extremely dangerous' climate change'.

It is argued that many species and vulnerable people in poor countries are struggling with the impacts already and, even if no more CO₂ were emitted, the emissions of global warming gases that have already occurred will cause at least a further 0.5°C degree warming and have consequences for another two hundred years (Hansen 2010; Li 2008).

Figure 2.1

Mauna Loa CO₂ Record: December 2010



Source: <http://www.esrl.noaa.gov/gmd/ccgg/trends/>. Accessed January 2011

Global warming however is only one indication of the enormous rift between humans and the environment. Such warming both coincides with and will compound a number of other biophysical crises: species extinction; depletion of the oceans' fish populations; desertification; land and soil degradation/toxification; deforestation; air pollution; water shortages/pollution; the peaking of world oil production; food crises and many macro-social problems such as poverty, inequality and insecurity. While all cannot be attributed solely to the globalised, dominant political economy of capitalism, this thesis provides supported argument that globalised capitalism has been the dominant driving force (Amin 1992, 2009; Bagchi 2005; Fanon 1967; Harvey 2005; Navarro 2002, 2007; Sweezy 2004; Wallerstein 1976). All of these factors together amount to what has been labelled a 'crisis of civilisation' (Amandla 2010).

Scientists at the Stockholm Resilience Centre (2010) have identified nine planetary boundaries which, if transgressed, may be devastating for human survival. The factors involved are climate change, stratospheric ozone, land use

change, freshwater use, biological diversity, ocean acidification, nitrogen and phosphorus inputs into the biosphere and oceans, aerosol loading and chemical pollution. The Centre suggests that the factors are interconnected and for three of them - climate change, biological diversity and nitrogen input to the biosphere – the boundaries have already been crossed, thus threatening the ability of the other indicators to stay within their boundaries.

In other words, within a short space of time we are facing not only the very real possibility of irreversible global warming tipping points being passed, but a range of indicators predicting that the Earth's biosphere is being irretrievably degraded to a point where it will no longer be capable of supporting human and other species' life. As Foster (2009: np) contends 'it is impossible to exaggerate the environmental problem facing humanity in the twenty-first century'. Parallel to, and compounding the crises of the biosphere, are the social crises – poverty, inequality, food and water insecurity, and war.

Another useful measure of how the human species has taken the planet to the brink is by considering the ecological footprint – that is, how much of the biosphere is required to produce and reproduce the conditions of life enjoyed by individuals, communities, countries and global society as a whole. This is measured in global hectares, giving a measure for comparing what the biological capacity of the Earth is compared with what is extracted from the biosphere to produce what is consumed. The Global Footprint Network's (2010) *Living Planet Report* states that humanity's ecological footprint has more than doubled since 1966. In 2001, humanity used the equivalent of 1.5 planets to support its activities. By 2030, it projects that humanity will require the capacity of two Earths to absorb carbon dioxide wastes and keep up with natural resource consumption.

2.3 The causes

Canadell *et al.* (2007) claim that climate change is due to global economic growth, a more carbon-intensive economy and a reduced capacity of the land

and oceans to absorb carbon from the atmosphere. They maintain that the principal human induced causes of global warming are fossil fuel extraction and consumption, land use and deforestation. The declining ability of the 'sinks' (oceans, forests and land) to absorb carbon dioxide and other greenhouse gases will exacerbate the warming cycle and at the same time increase the uncertainty in modelling predictions.⁹

Industrialisation (including deforestation and land clearing) has resulted in growing amounts of green house gases (GHGs), including CO₂, being emitted into the atmosphere from the burning of fossil fuels in which carbon has been stored in an inert form for millions of years. Around 97 per cent of the CO₂ emitted by Western industrialised countries comes from burning coal, oil and gas for energy (Global Carbon Project 2010). Before the industrial revolution, CO₂ levels were around 580 billion tonnes of carbon in the atmosphere. In 2007, the figure was close to 750 billion tonnes, 90 per cent of it emitted by the rich industrialised countries (Lohmann 2007: 6).

CO₂ emissions from fossil fuel burning and industrial processes have accelerated globally, with an annual growth rate increasing from 1.1 per cent for 1990–1999 to more than 3.3 per cent for 2000–2006 (Global Carbon Project 2010). Global economic growth, the energy intensity of growth and the carbon intensity of energy in the early twenty first century have all been exceeding expectations that had been built into influential assessments of climate change (such as the IPCC's and the 2003 Stern Review) and it has been assumed this trend will continue (World Watch Institute 2009). At the same time, until recently, half of the global emissions of CO₂ were being absorbed by land, forests and ocean with the other half remaining in the atmosphere (Miller 2008). Over the years these sinks have been responsible for removing 55 per cent of the carbon emissions from human activities – with land and forests removing 30 per cent and the ocean 25 per cent. Fifty years ago, for every ton of CO₂ emitted into the atmosphere, natural sinks removed 600 kg (Canadell *et al.* 2007; Global Carbon Project 2010). Currently, that figure has

⁹ Many of these 'feedbacks' are absent from current climate models which means that estimates tend towards the conservative.

fallen to 550 kg and it is falling further (Canadell *et al.* 2007; Global Carbon Project 2010).

While the atmospheric concentration of carbon dioxide has increased by 35 per cent, the level of atmospheric methane has risen much more, by 151 per cent, mostly from agricultural activities such as raising cattle and growing rice (Canadell *et al.* 2007; Global Carbon Project 2010). Methane is much more potent and problematical as a greenhouse gas than CO₂.

Currently the amount of fossil fuel carbon emitted into the atmosphere each year is greater than for the most fossil-fuel intensive of the IPCC emissions scenarios developed in the late 1990s (Canadell *et al.* 2007). With respect to big emitters, China passed the United States as the top emitting country in 2007 (Vidal and Adam 2007), although China's per capita carbon emissions remain well below those of the United States, which, on a per capita basis, are comparable to Australia's per capita emissions (Vidal and Adam 2007).

Per capita emissions in the poorer, less industrialised countries remain well below those in industrial countries (Global Carbon Project 2010). No region is decarbonising its energy supply and the growth rate in emissions is greatest in rapidly developing economies, particularly China. Global energy consumption is expected to grow by 50 per cent by 2030 (from 2008) (Hightower and Pierce 2008: 285). The combustion of fossil fuels, primarily coal, oil and natural gas, accounts for about 74 per cent of all CO₂ emissions and for roughly 57 per cent of all greenhouse gas emissions globally (Hightower and Pierce 2008).

The International Energy Outlook (EIA 2010) projects world energy-related carbon dioxide emissions will grow from 29.7 billion metric tons in 2007 to 33.8 billion metric tons in 2020 and 42.4 billion metric tons in 2035. A significant dimension of energy use is the so-called 'carbon intensity' of the global economy. This is the amount of carbon emitted to produce one dollar of wealth. Even in its most conservative projection, the IPCC assumed that the trend of decreasing carbon intensity would continue. This has ceased to be the case. After almost 100 years of improvements since 2000 the long-term trend

of declining CO₂ emissions per unit of energy has reversed (Global Carbon Project 2010).

Additionally, what has happened is that, as Li (2008: np) writes, falling energy intensity (resulting from rising energy efficiency) has translated into more rapid capital accumulation (economic growth) and has rarely led to absolute declines in energy consumption. This is known as the 'Jevons Paradox', named after the nineteenth century British economist William S. Jevons (1866) who first noted this perverse effect.

Since 1750 developed countries, with less than 20 per cent of the world's population, have been responsible for 80 per cent of the atmospheric CO₂ accumulation (Global Carbon Project 2010). The world's poorest 800 million people have contributed less than 1 per cent. Yet the latter are the most vulnerable to the effects of global warming.

It has been the use of fossil fuels by the industrialised countries which has raised atmospheric CO₂ to its current level. Today however the rapid, coal-dependent development of China and India is the most important driver of growth in global carbon dioxide emissions. Between 2000 and 2007, carbon emissions from fossil fuel combustion worldwide increased 22 per cent to an estimated 8.2 billion tons per annum, according to Flavin (2008) from the Worldwatch Institute. China produced 57 per cent of the growth in emissions during this period; India contributed 8 per cent, the United States and Europe 4 and 3 per cent, respectively. (Flavin 2008). The ratio of per capita emissions for Americans and Chinese is more than 4 to 1; compared to Indians more than 13 to 1; and to Africans 18 to 1. Coal provides 70 per cent of the commercial energy in China (and 56 per cent in India).

The only industrialised countries which reduced their carbon emissions during the 1990s were the Soviet Union, due to the collapse of its economy; France, because of the significant growth in reliance on nuclear power; and the UK,

with the opening of the North Sea oil and gas fields and the closing of coal mines (Lohmann 2007).

There is inevitably a high correlation between economic growth and energy consumption, with world economic growth being one of the best predictors of global energy consumption (Stern 2003). Now, as access to oil and gas fossil fuels becomes more difficult, the use of more carbon intensive fuels is growing. It is to be noted that the energy intensity of fossil fuels can vary dramatically across types of fuel. The combustion of coal for example generally releases 1.8 times as much carbon dioxide per unit of energy as natural gas does and 1.3 times as much as oil (Worldwatch Institute 2009). Again the production of oil from Canada's tar sands emits up to three times as much carbon as producing conventional oil (Worldwatch Institute 2009).

Despite the irrefutable evidence of the relationship between fossil fuel use and carbon dioxide emissions, the search for and extraction of fossil fuels are continuing at what appears to be an unprecedented rate, fuelled in part by anticipated shortages, growing investments and increasing prices. Just as one example, an Arctic land grab is under way by the five countries with Arctic coastlines: Russia, Denmark, Canada, the United States and Norway. It is ironic that the thawing of the Arctic which has happened because of global warming is seen as a boon to enable access to huge reserves (Klare 2008). As Gare (2008) argues, the environment is defined by its exchange value and environmental destruction increases profits; when there are shortages, prices rise and the greatest profits are made.

Hence, the scientific evidence of anthropogenic global warming is incontestable. Most of the consequences however are in the future and the course of global warming remains uncertain. For some of the low lying coral atoll islands such as Kiribati in the Pacific Ocean, for low lying coastal regions such as the Bay of Bengal, for some drought stricken areas of Africa, the effects of global warming are here and now.

So what are the projections for future global warming? The next section turns to this question.

2.4 The future

As has already been stated it is impossible to exaggerate the problem presented by global warming. Further warming is already locked in, with greenhouse gases having lifetimes of decades and centuries. According to the organisation 350.org, unless we reduce the amount of carbon dioxide in the atmosphere to 350 parts per million (the level passed in 1988) as a matter of urgency, we will cause huge and irreversible damage to the Earth. In 2009, emissions levels decreased by 1.3 per cent due to the global recession but have since returned to a growth rate of 3 per cent per annum (Black 2010). Le Quere (quoted in Garfield 2008), professor of environmental sciences at the University of East Anglia and the British Antarctic Survey, stated that such emissions levels presaged a global average temperature rise of up to 6.1°C over the next century (UNEP 2006). Lovelock (2006), a somewhat controversial scientist, predicts that if the forces at work in the economy continue on their present trajectory, only a few hundred million people living close to the North Pole will survive this century.

Hansen *et al.* (2008: 7-8) write:

Our home planet is dangerously near a tipping point at which human-made greenhouse gases reach a level where major climate changes can proceed mostly under their own momentum. Warming will shift climatic zones by intensifying the hydrologic cycle, affecting freshwater availability and human health. We will see repeated coastal tragedies associated with storms and continuously rising sea levels. The implications are profound, and the only resolution is for humans to move to a fundamentally different energy pathway within a decade. Otherwise, it will be too late for one-third of the world's animal and plant species and millions of the most vulnerable members of our own species.

According to the IPCC (2007: 72), there are a number of uncertainties that if resolved, 'could lead to new robust findings', meaning in essence that their projections would be more alarming. These uncertainties include the magnitude of CO₂ emissions from land use change; the scarcity of data from some regions, particularly poor countries; the analysis and monitoring of changes in extreme weather events; and 'how development planners incorporate information into their decisions' (IPCC 2007: 72). Juxtaposed to this critical situation has been the inability of the global and nation-state institutions even to begin to take appropriate action.

The science has moved on from the 2007 IPCC report. The consequences of global warming may be moving even faster. In an exercise that reveals the extent of the challenge facing humanity, Monbiot (2007: 17) took the global figure for carbon dioxide production in 2000 together with figures presented by the IPCC in 2007 showing the cuts necessary to prevent global warming from eventually exceeding 2°C. He estimated this would mean that, by 2050, the world would need to cut its emissions to roughly 15 per cent of their volume in 2000.

Monbiot (2007:17) continues:

I looked up the global figures for carbon dioxide production in 2000 and divided it by the current population. This gives a baseline figure of 3.58 tonnes of CO₂ per person. An 85 per cent cut means that (if the population remains constant) the global output per head should be reduced to 0.537 tonnes by 2050. The UK currently produces 9.6 tonnes per head and the US 23.6 tonnes. Reducing these figures to 0.537 means a 94.4 per cent cut in the UK and a 97.7 per cent cut in the US. But the world population will rise in the same period. If we assume a population of 9 billion, the cuts rise to 95.9 per cent in the UK and 98.3 per cent in the US.

Furthermore Monbiot (2007) points out that the IPCC figures might be out of date and also underestimate emissions due to missing carbon cycle feedbacks

which he claims currently account for 18 percent of global warming but are likely to intensify.

In a paper presented in the *Geophysical Research Letters*, Weaver *et al.* (2007) argue that even with a 90 per cent global cut by 2050, the 2°C threshold would eventually be broken. That paper suggests that to stabilise temperatures at 1.5°C above the pre-industrial level requires a global cut of 100 per cent, in other words a complete decarbonisation of the economy.

The world population is growing, projected to be 9 billion by 2050. So too is the global economy and the latter is much more of a problem, especially as, at the very core of the global market economy, is the fundamental principle of economic growth which is dependent on fossil fuels. This is not news. That issue was central to the deliberations of the Club of Rome in 1972, published in the report *Limits to Growth* (Meadows 1972). Yet in the intervening four decades, the issue has been very largely ignored. As economic growth occurs in carbon-based growth economies, the demand for fossil fuels rises as well as the emissions of greenhouse gases. Neither increased energy efficiency of existing energy sources nor renewables can do much to arrest this process.

Monbiot (2007: 17) writes about how the implications of economic growth to carbon reduction targets were driven home to him:

Professor Rod Smith [shows] that a growth rate of 3 per cent means economic activity doubles in 23 years. At 10 per cent it takes just seven years. This we knew. But Smith takes it further. With a series of equations he shows that "each successive doubling period consumes as much resource as all the previous doubling periods combined. In other words, if our economy grows at 3 per cent between now and 2040, we will consume in that period economic resources equivalent to all those we have consumed since humans first stood on two legs. Then, between 2040 and 2063, we must double our total consumption again. Reading that paper I realised for the first time what we are up against.

While the industrialised nations are calling for cuts to greenhouse gas emissions in the rapidly industrialising Third World¹⁰, such development is strongly predicated on fossil fuel energy. For example, in just one of a number of such projects, in 2008 the World Bank underwrote a \$4.1 billion, coal-powered Tata Ultra Mega plant in Gujarat in western India which would emit 25.7 million tons of carbon dioxide per year making it one of the world's 50 largest greenhouse-gas emitters (Nace 2008). The Tata plant was to be classified under the Kyoto Protocol as a Clean Development Mechanism¹¹ development because it would be using 'super critical coal technology', a technology which would produce slightly higher energy efficiency from the coal than average. Lohmann (2007) argues that despite the World Bank's involvement in carbon trading initiatives, such as the Clean Development Mechanism and Prototype Carbon Fund, from 1992 to 2004 it approved \$11 billion in financing for 128 fossil-fuel extraction projects in 45 countries, projects which will ultimately lead to more than 43 billion tonnes of carbon-dioxide emissions, a figure hundreds of times more than the emissions reductions that signatories to the Kyoto Protocol are required to make between 1990 and 2012. I will look at another example of World Bank funding, namely for the expansion of the coal sector, in the South African study in Part II.

2.5 Conclusion

What emerges here is that, while global warming is the focus of this thesis, it is not possible to isolate it as an issue in terms of its causes, effects and solutions. The thesis as a whole thus spreads itself more widely.

Nevertheless, the science is clear. Global warming is happening and threatens the very existence of life on the planet. The causes are very much a function of the growing global economy, the use of increasing quantities of fossil fuels and the decreasing ability of 'sinks' to cope. The world is heading into very dangerous territory in terms of the survival of species. It may well be already in territory from which there is no return.

¹⁰ I use the term 'Third World' in the thesis as it is evocative of un and under-development, poverty, exploitation and exclusion, rather than being a uniform or analytically precise term.

¹¹ The Clean Development Mechanism (CDM) refers to a market mechanism whereby rich countries can count as a reduction in their emissions the equivalent of emissions reduced by investing in projects which save carbon emissions in developing countries.

This thesis seeks to explain in terms of political economy how we as humanity got here and how we might just possibly still escape.

CHAPTER 3 Global warming: proposals for solutions

3.1 Introduction

The purpose of this chapter is two-fold. First it sets out the global warming solutions proposed to date and puts these in the context of the political economy of the international institutions that have been dealing - or failing to deal - with these issues. Second the chapter examines whether the predominant global warming solutions proposed to date do constitute genuine solutions. These fall into three broad categories: market, technical and biological (or biofuels). I will refer in general to these three categories as neoliberal solutions, as they have developed out of the dominant neoliberal political economy. I have only briefly touched on nuclear powered energy (a fourth solution) as a substitute for fossil fuels as, while there has been a revival of arguments used in favour of nuclear power (including from Hansen and Lovelock), these do not stand up to examination and have been dealt with extensively elsewhere.¹²

There has been considerable energy, billions of dollars in public and private investments (Bond and Erion 2009; Vidal 2008) and much precious time (one could argue in excess of 14 years for Kyoto's carbon markets) devoted to neoliberal solutions to global warming. Global emissions continue to increase by 2–3 per cent per annum and we have gone beyond the safe limit for carbon dioxide equivalent in the atmosphere. To settle for these options and to indulge in the degrees of optimism surrounding their effects might just possibly be justified if we were here dealing with the prevention of some relatively insignificant adverse event and if time were not of the essence. We are not; we are seeking to address the greatest threat humankind has ever faced, not in a thousand years but in a generation. It is a time not for optimism but for realism. This chapter seeks to provide some of that realism.

¹² For example, see Clarke 2010, Why James Hansen is wrong on nuclear power. <http://links.org.au/node/1607>. Accessed January 2011; Caldicott 2006; Environmentalists Do Not Support Nuclear Power: Critique of James Lovelock and Patrick Moore 2007 <http://www.foe.org.au/anti-nuclear/issues/nfc/power/nuke-enviros/view>. Accessed January 2011.

The chapter begins by showing how public awareness of humans' destructive use of the environment has grown over time. There is then, in section 3.3, consideration of how internationally that awareness led governments in the late 1990s to the signing of the Kyoto Protocol. Given the importance of that Protocol and the sorts of market solutions it proposed, both sections 3.4 and 3.5 are devoted to it, first explaining it and then criticising it. Section 3.6 examines other proposed solutions to global warming. The chapter concludes in section 3.7 that none of these solutions whether individually or in tandem is sufficient to provide an answer.

3.2 Growing public awareness

One of the earliest and most influential environmental books, published in 1962, is Rachel Carson's seminal work, *Silent Spring*, which drew attention to the consequences for the environment of indiscriminate use of pesticides and the efforts of corporations to suppress this information. In the 1960s and 1970s, UK economist Barbara Ward wrote several books in the same vein, including *Only One Earth* (1972), written with René Dubois. That book broadened the popular base of environmentalism and connected ideas of sustainability to economics. Ward and Dubois proposed that richer countries should commit a certain proportion of their GNP in aid to the developing world. They started to see a close connection between wealth distribution and conservation of planetary resources, advocating for the careful husbandry of the Earth as an essential ingredient for the survival of the human species, and for the creation of decent ways of life for all the people of the world.

In 1966 eminent economist Kenneth Boulding (1966) wrote *The Economics of the Coming Spaceship Earth*, describing the economies of industrial countries as 'cowboy' economics, exhibiting reckless, exploitative and violent behaviour. Boulding maintained that there was a need to constrain extraction and consumption, to limit pollution and to restore the material world. He argued for goods to be produced that would last as long as possible. Boulding's

influence led in the 60s and 70s to an increasing awareness that economic growth was causing environmental decline.

In terms of growing public awareness, another highly significant publication during the 60s was Garret Hardin's *The Tragedy of the Commons* (1968). This argued *inter alia* that there cannot be unlimited population and unlimited use of resources and that the higher the population level, the lower has to be the standard of living, and vice versa. Hardin's work initiated calls to put an economic value on the ecology. In the early 1970s the Club of Rome's *Limits to Growth* (Meadows 1972) was published, predicting a catastrophic collapse of society as a result of the growth in the use of resources, of pollution and, particularly, of the population. This book contained a condemnation of both capitalists and socialists alike, as both saw economic growth as essential for progress (Beder 2006: 14). *Limits to Growth* is something of an intellectual reference point for the issue of global warming. It is not a critique of global capitalism as such but rather of continuing growth, consumption, population and pollution in a finite world.

That early environmental literature did not connect with the more critical writers of that time, such as Franz Fanon (*The Wretched of the Earth* 1967) writing on the violence of colonialism, or Andre Gunder Frank (*The Development of Underdevelopment* 1966), an early exponent of the theory that rich, developed countries gain from poor, under-developed countries, so long as they remain as colonies in the international capitalist system. Writers in the Marxist tradition, such as Frank, but also Baran and Sweezy (*Monopoly Capital: An Essay on the American Economic and Social Order* 1966), contributed significantly to laying the intellectual foundations for the radicalism of the 1960s and 1970s in the West and the social justice component of contemporary environmentalism. Yet while they did so in the context of the need to address the global poverty/wealth, development/under-development gap, in the industrialised West no strong connection was made between the critique of capitalism and the environment, leaving a vacuum in intellectual pursuit until more recent times, with writers such as John Bellamy Foster (*Ecology Against Capitalism* 2002) and in journals such as *Monthly Review*

and *Capitalism Socialism Nature*. Thus while in these early days, people did predict a pending doomsday and advocated a moratorium on economic and industrial growth, these ideas faded into the background, particularly with the rise and increasing ideological hegemony of neoliberalism in the late 1970s.

It is also relevant to bring in the more popular global warming literature which also illustrates the limitations of the hegemonic positivist ideological framework. Since 2005, there has been a spate of popular English language books on global warming. Along with documentary-style television programs and films such as Al Gore's *An Inconvenient Truth* (2006), this literature has played a significant role in bringing about the beginnings of the necessary cultural shift in attitudes to global warming. While global warming is now very much on the agenda politically, in part due to this literature, it is also illustrative of the dominance of the neoliberal paradigm in the political/cultural context as it fails to examine the structural issues of global warming. Jarred Diamond's *Collapse. How Societies Choose to Fail or Survive* (2005) uses environmental-caused collapses of societies from previous eras, up to and including the genocidal war in Rwanda, to provide a warning to our current civilisation. Curiously, given the historical scope of collapsed societies covered in his book, Diamond's solutions (to today's environmental problems) focus not on structure but on the individual: how one votes, consumer spending and advocacy, concentrating on one's local environment and donating discretionary money to environmental causes. Tim Flannery's *The Weather-Makers*, published in October 2005, also emphasises the role of the individual, making a passionate plea for lifestyle changes. He argues 'there's no need to wait for government to act, you can do it yourself' (Flannery 2005: 303). Like Flannery, science journalist George Monbiot also calls for lifestyle changes. Monbiot's *Heat: How to Stop the Planet Burning* (2006) rightly dismisses carbon offsetting, drawing an analogy between that and pushing food around on a plate to make it look like it has been eaten. He also forecasts that our society will look like a poor Third World country if we press ahead with the 90–100 per cent carbon emission reductions necessary to prevent climate warming catastrophe. Monbiot provides detail on how we can cut our carbon dioxide emissions, starting with our homes, our energy systems, and our

transport, retail and construction industries. He also draws attention to the interests that have funded climate change denial. He does not however call for structural, political economy change.

Mark Lynas, in *Six Degrees. Our Future on a Hotter Planet* (2007), explores what conditions on the planet will be like as temperatures rise through each additional degree. He turns to carbon rationing as a solution to global warming, arguing that rationing (of goods) in the United Kingdom during the Second World War brought about a dramatic improvement in the quality of life of people – and carbon rationing would do likewise. There is much merit in this argument. Each of these books has great potential to raise the level of awareness but they have failed to galvanise the level of action required and do not attend to the need for structural change. Significantly, they make no connection between the ecological debt and ecological credit issues, the inequitable and unjust relationship between levels of consumption in the North and South and the price that is already being paid in the South as a result of global warming.

Taking a different tack, Eugene Linden (2006: 257-258) in *Winds of Change* writes of the demise of civilisations across the millennia because of resource abuse and changing weather. He states:

Having proven through history that extreme climate shifts are costly if not fatal for past civilizations, our species is busily pushing the climate towards producing extremes never before experienced during modern times. Instead of preparing or trying to avert climate change, people are dismantling natural protections against climate extremes and making changes that will likely amplify the events themselves. The explanation [is] a combination of a collective failure of the imagination, and belief in the godlike power of markets and progress.

New York Times writer Elizabeth Kolbert (2006) visits numerous locations where the effects of global warming are evident. At one site (permafrost melting) she records that such melting has the potential to add a further billion

tons of the potent greenhouse gas, methane, into the atmosphere. As the world moves closer to the unknown tipping point – whether it is 350 ppm CO₂ or 450 ppm CO₂ - the continuing of ‘business as usual’, Kolbert claims, is a very high risk response. Kolbert (2006: 189) in her conclusion writes that ‘it may seem impossible to imagine that a technologically advanced society could choose, in essence, to destroy itself, but that is what we are now in the process of doing’.

Beyond this literature, it would be remiss at this stage not to mention that which is concerned with the more readily identifiable denialism of global warming as it has been very effective in ‘muddying the waters’ even within the neoliberal positivist framework. One book from the US, *Merchants of Doubt* (2010) by Naomi Oreskes and Erik Conway, captures how a loosely-linked group of high level scientists, with strong connections to politics and industry and a particular political agenda, have effectively conducted a campaign of obfuscation around the science of global warming (with assistance from a complicit media). Oreskes and Conway provide an authoritative account of how this group was involved in, or funded by, the same bodies which conducted campaigns to mislead the public over issues such as the links between smoking and lung cancer, CFCs to the ozone hole and coal pollution to acid rain. Oreskes and Conway are writing from the experience of the US where ‘big money’ (Sachs 2010) has been involved in backing climate change deniers, bringing doubt to the global warming science and effectively making controversial in the public arena that which is now scientifically certain.

Alongside this literature and the growing public awareness reflected in most of the literature, the United Nations environment agenda was developing, from a 1972 conference through to the Kyoto Protocol in 1997 and beyond. The next section looks at this in the context of the two broad families of international institutions – the United Nations and the Bretton Woods institutions - to allow an understanding of the development of international environmental governance.

3.3 Background history of international responses to global warming

During the second half of the twentieth century, two broad families of international institutions, (the United Nations and the Bretton Woods financial institutions) were developed to facilitate various aspects of international relations and governance. Both families have approached the world through a Western perspective and were developed on the basis of modernisation theory, assuming that Western values are both superior and universal (Lohmann 2009; McIntyre and Mooney 2007; Raffer and Singer 2001; Shiva 1993). Perhaps more importantly, both families of institutions have long since adopted the political economy models of capitalism, particularly in more recent times, neoliberal capitalism.

The first step in creating modern international financial institutions was made at Bretton Woods in July 1944, heavily influenced by John Maynard Keynes, the British macro-economist. The Bretton Woods institutions were to promote international financial and commercial relations between the major industrialised nations and to create an international economic order to prevent further depressions such as the Great Depression of the 1930s and the war that followed. Keynes' vision was of a global macroeconomic and financial system of management, a global currency and a world central bank which would maintain full employment and provide the liquidity required for these purposes (Raffer and Singer 2001: 2-4).

This vision is unfortunately so very different from what has emerged in practice from the Bretton Woods institutions of the International Bank for Reconstruction and Development – now the World Bank – and the International Monetary Fund (IMF). The latter was established as an international institution to manage international payments but 'changed from an institution of collective action into an instrument to discipline others' (Toye 2003: 359). The multilateralism of Keynes has been replaced by the global economic dominance of the United States and the other G8 countries.¹³

¹³ The G8 consists of the United Kingdom, United States, Canada, France, Germany, Italy, Japan and Russia.

The United Nations was founded after World War II to promote world peace and facilitate cooperation in international law, international security, economic development, social progress and human rights. It is a much more genuinely international organisation based on one member (nation), one vote, although this arrangement is also not without its limitations.

While the Bretton Woods institutions were envisaged as specialised agencies of the United Nations, today, 'the secretary-general of the United Nations is not even allowed to address the annual meetings of the Fund and Bank' (Raffer and Singer 2001: 6). Raffer and Singer (2001: 7) continue:

the UN was not to be trusted with the hard instruments of development such as finance and macroeconomic policy making; that was to be the preserve of the Bretton Woods institutions with their system of weighted voting and firm control by the Western industrialised countries. The UN was to be put in charge of the 'soft' instruments, such as food aid, technical assistance, children, women, social policy and more recently, the environment.

The political economy rules of the Bretton Woods institutions today have, according to Raffer and Singer (2001: 9), resulted in a 'constant tendency to transfer income from poorer to richer countries [offsetting] much of the flow of aid and investment into poorer countries.' This has been further added to 'by enforced country-by-country stabilization and structural adjustment programs' (Raffer and Singer 2001: 9). The Bretton Woods institutions have become immensely more powerful than the UN, giving more power to the interests of the world's rich and powerful, who have withheld energy and resources from the UN and invested them instead in the IMF and the World Bank (Raffer and Singer 2001: 10). The world's most powerful countries, representing less than 20 per cent of the world's population, have hugely disproportionate power in the Bretton Woods institutions because of the membership, chairmanship and voting system (one dollar, one vote, as compared to the UN, one country, one vote).

This is the setting for international environmental governance. The environment is a 'soft' issue and hence comes under the United Nations institutions with considerably less power and influence than the World Bank, the IMF, the G8 and the WTO, all institutions which play key roles in supporting the global economy *status quo*. The *raison d'être* for these latter institutions is economic growth and capital accumulation. As environmental justice group Global Exchange (2008) claims, for example, the WTO is used by corporations to dismantle hard-won local and national environmental protections on the grounds they are 'barriers to trade.'

The history of global environmental efforts can be traced back to the UN Conference on the Human Environment in Stockholm in 1972 which in turn led to several multilateral environmental agreements (Khator and Fairchild 2005). This was succeeded by the World Commission on Environment and Development (WCED) (1983-85), chaired by Gro Harlem Brundtland, a former Norwegian Prime Minister and Minister for the Environment. It was this Brundtland Commission which set the contemporary environment agenda (Middleton and O'Keefe 2001). The *Brundtland Report* (1987: 43) focussed attention on the need for economic development, supporting the idea that economic growth was sustainable provided it was brought about largely through improved technologies, thereby avoiding destroying or depleting natural resources but also ensuring a redistribution of resources towards poorer nations. The call for economic growth at that Stockholm Conference was made in the interests of developing nations. The Report (1987) argued that sustainable development has to meet the needs of the present but weigh this up with the ability of future generations to meet their needs. The notion that the affluent nations reduce their own growth to make room for the growth of poorer nations was not raised, nor were the structural or political economy issues of environmental degradation.

The Commission sought to elevate the status of environmental issues to a global level. Finger (1993: 43) states that the *Brundtland Report* was about awareness raising and planetary stewardship. It said nothing about power structures. Middleton and O'Keefe (2001: 2-3) echo this view, suggesting that

the concept of sustainability ‘was deliberately ill-defined to prevent unnecessary and destructive objections. [E]conomic concerns were reduced to interpreting the environment as a market problem, not to an analysis of the market as an environmental problem.’

In the late 1980s the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO) established the Intergovernmental Panel on Climate Change (IPCC) to investigate climate change. The IPCC was and is built on a peer review process that is exhaustive, both a strength, in establishing the credibility of the research, but also a weakness, particularly in more recent years as we approach (or pass) tipping points and the speed of climate change gathers momentum.

In the wake of the *Brundtland Report*, the United Nations General Assembly set up the Rio Earth Summit for June 1992, to examine progress on the Report, to re-think economic development and to stop the destruction of irreplaceable natural resources. For a UN conference, Rio was unprecedented in its size and scope. It was significant not in what it achieved, which was remarkably little, but that so many powerful institutions participated, including many multinational corporations, in particular the fuel and vehicle sectors which were anxious about the direction in which UN environmental conferences were heading. It is significant that at about this time the Global Climate Coalition (GCC) was formed as a powerful lobby group of car manufacturers and oil companies which were then largely responsible for persuading the US government to prevent the Rio Summit from adopting anything that might threaten their interests (Middleton and O’Keefe 2001: 41). I note that the members of the GCC included the American Petroleum Institute, Chevron, Chrysler, Cyprus AMAX Minerals, Exxon, Ford, General Motors, Shell Oil, Texaco and the United States Chamber of Commerce. It was involved in aggressive lobbying at international climate negotiation meetings, including in the lead up to the Rio Earth Summit in 1992, where it persuaded the US government to avoid mandatory emissions controls, and in 1997, prior to treaty negotiations in Kyoto, when it launched an advertising campaign in the US

against any agreement aimed at reducing greenhouse gas emissions internationally (Sourcewatch 2010).

Banuri (1993) writes that overall the Rio Summit is best seen from two perspectives: that of the rich North, which was pictured as defending the Earth; and that of the South, which believed that it was to remain poor and suffering so that the North could continue its rich lifestyle. This was particularly the case around the issue of historical ecological debt incurred by northern industrialised nations toward the Southern non-industrialised nations. It is telling that the Rio Summit made no mention of reductions in consumption and lifestyles by the rich or of the issues of ecological debt. Yet, as Banuri (1993) argued (albeit in 1993), if the South disappeared tomorrow, the environmental crisis would still be here - but not if the North disappeared.

The overriding significance of Rio was that, for the first time, governments acknowledged the threat of the ecological crisis and the need to establish a framework for tackling climate change. It also drew attention to the facts that poverty and excessive consumption by the affluent were placing stresses on the environment and that economic decisions had to take environmental impacts into account. There was further a clear recognition that fossil fuels were linked to global climate change. It failed however to recognise the significance of the historical, material and structural underpinnings of environmental problems such as global warming, or that inequality and poverty grew out of the same global political economy and could not be separated from the environmental issues. To me this signals that whatever the solutions developed from the UN institutional processes, they were most likely to be ineffective.

At the same time as this conference was being planned and executed, the IMF, the World Bank and various free trade agreements were busily restructuring global trade, banking and investment rules and driving these matters in the completely opposite direction to the rhetoric of the Rio Summit. It is significant that three years after Rio, the World Trade Organisation (WTO) was established (in 1995). That body has consistently skewed trade benefits to the North (Khator and Fairchild, 2005) and undermined UN environmental

governance efforts. The WTO has been highly influential in shaping the world economy by promoting free trade of goods (and later services) across national borders and adversely affecting national environmental governance structures where they have existed and placing barriers to their formation, where they have not. It is argued by many that free trade encourages and even obliges countries to ignore their commitments to environmental obligations and human rights (Barrett 1994; Global Exchange 2009; Khator and Fairchild 2005). The Rio Earth Summit, with its grand motherhood statements, was no match for the cut and thrust of the global capital accumulation imperatives.

Scientific evidence of anthropogenic global warming continued to mount during the 1970s and 1980s. In 1988, James Hansen, the director of NASA's Goddard Institute for Space Studies, appeared before a hearing of the U.S. Senate Committee on Energy and Natural Resources and, in a historic testimony lasting only fifteen minutes, made the points that: there was '99 per cent confidence that the earth was warming'; the warming could be traced with 'a high degree of confidence to the greenhouse effect; and that in his model the greenhouse effect was already strong enough to increase the odds of extreme summer heat and drought in the US' (McKibben 2006: np).

International discussions to control greenhouse gas emissions began in the early 1990s under the auspices of the United Nations. The resulting treaty, the United Nations Framework Convention for Climate Change (UNFCCC) was agreed to in 1992 in Rio de Janeiro in what is known as the 'Earth Summit'. The purpose of the treaty was to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic global warming by imposing voluntary limits on greenhouse gas (GHG) emissions. One outcome of the Treaty was to establish national inventories of GHG emissions which were used to create the 1990 benchmark levels for developed countries. This first UN international environmental treaty has been described however as being no more than 'aspirational' (Middleton 2001: 41).

3.4 Kyoto

When the UNFCCC voluntary emission targets failed to reduce emissions, renewed negotiations led in 1996 to the IPCC concluding in their Second Assessment Report (Bolin *et al.* 1995: 4) ‘that the balance of evidence suggests that there is a discernible human influence on global climate’. Emissions continued to rise. This led to the development of the internationally binding Kyoto Protocol, adopted by the UNFCCC in Kyoto, Japan in 1997 and which came into force in 2005. Most countries signed, but some, such as the United States and Australia (prior to the Rudd government signing in December 2007), chose not to ratify it.

Emissions have continued to rise since the signing of the Kyoto Protocol. In short, Kyoto has failed as a solution to global warming. It is however an important policy event in the history of global warming action internationally. I have therefore chosen in this section to describe Kyoto briefly and in the next to provide some key points of criticism of it.

The Kyoto Protocol set GHG emissions at 5.2 per cent below 1990 levels by 2008-2012, for all industrialised countries. Under the principle of common but differentiated responsibilities, the Protocol required developed nations in general to make larger cuts. The reason for this was two-fold: developed countries could better afford the cost of cutting emissions and, secondly, these countries have historically contributed more to the problem.

The implementation of the Kyoto system consisted of two main thrusts. Firstly, governments of industrialised countries provided free tradable permits to large industrial polluters to emit a certain level of carbon dioxide; and second, trading schemes between GHG polluters were set up with additional pollution credits being able to be obtained by companies investing in the South in projects that would emit less carbon than if the investment had not been made.

The Kyoto Protocol developed three mechanisms whereby signatories could meet their GHG reduction obligations: (1) Emissions Trading in an emissions trading scheme; (2) the Clean Development Mechanism (CDM); and (3) Joint Implementation (JI). These are described below.

Under Kyoto, developed countries (labelled Annex 1 under Kyoto) can use an emissions trading system to help to meet their emissions targets. In such a scheme, countries can allocate permits to individual companies for the emission of a particular quantity of greenhouse gases. The level of permits decreases over time. If permits are issued to a level equal to or below the assigned amount, then, in principle, a country can meet its Kyoto commitment. If a country is incapable of meeting its target, it can buy permits from countries that are under their targets. Similarly, for companies within a country, a trading of permits is allowed for excess (or conversely reduced) amounts of carbon emissions produced. This is based on the assumption that the measures of emissions are accurate and honestly recorded. Additionally, companies and countries can sequester carbon by, for example, growing of forests and restoring vegetation. However, accounting for the carbon sequestered in forests is fraught with difficulties because of the variation from impacts of wider environmental conditions on the capacity of trees for absorbing carbon, the drying effects of plantations on soils (thus releasing carbon from the soil), the different stages of tree development absorbing and emitting different levels of carbon, the longevity of the plantation, and so on. The social impacts of tree plantations for carbon sequestration have also been significant to date with land being taken from poorer communities for plantation use. The largest and most stable carbon sinks are in fossil fuels in the ground – coal, oil and gas – the very fuels which power the current global economy. However, Kyoto does not directly tackle issues related to this source or sink.

The Clean Development Mechanism (CDM), under Article 12 of the Kyoto Protocol, is currently the predominant form of emissions transaction. The CDM allows a developed country with an emissions-reduction commitment to implement an emissions-reduction project in a developing country that is additional to what would have occurred in the absence of the certified project activity (Article 12, paragraph 5.2 of the Kyoto Protocol). Such projects can earn saleable certified emission reduction (CER) credits (by the sponsoring country/company) which can be counted towards meeting Kyoto targets. The idea of the CDM is that it seeks to support sustainable development and

emissions reductions in non-industrialised countries, while allowing industrialised countries flexibility in how they meet their emissions reductions.

The third market mechanism under the Kyoto Protocol is Joint Implementation (JI) where industrialised countries can invest in projects in other industrialised countries (Article 6 of the Kyoto Protocol). This allows a country with an emission commitment under the Kyoto Protocol to earn emissions reduction units from an emissions-reduction project in another Annex B Party (that is for example a poorer Eastern European industrialised country making a transition to a market economy), each equivalent to one tonne of CO₂ with this being counted towards meeting its Kyoto target. The idea is that JI offers parties flexible and efficient means of meeting their commitments, with the host party benefitting from foreign investment and technology transfer.

3.5 Criticisms of Kyoto

There are other proposed solutions to global warming (and these are dealt with briefly in section 3.6). As far as I am aware, none of even the more ardent supporters of these others, such as renewable, sees these as comprehensive solutions but only ameliorating global warming. Carbon trading has been seen as a potential saviour although this was not the intention originally of Kyoto. However, debunking carbon trading is important as such trading is unlikely to lead to even an amelioration of global warming.

It is important to set the Kyoto protocol in proper perspective. It was originally intended only as a first small step in the move to cut greenhouse gas emissions. It is based on the premise that 'removals by sinks' could compensate for 'emissions by sources'. There is however no evidence for this (Lohmann 2007: 37).¹⁴

¹⁴ Publications dealing with a critical appraisal of carbon trading include: Lohmann's seminal work, *Carbon Trading: A Critical Conversation on Climate Change, Privatisation and Power* (2006) which is a study funded by the Dag Hammarskjöld Foundation; *The Carbon Neutral Myth: Offset Indulgences for Your Climate Sins* produced by Carbon Trade Watch (Smith 2007) and, more recently, Friends of the Earth's *A Dangerous Obsession: The Evidence Against Carbon Trading and For Real Solutions to Avoid a Climate Crunch* (FOE 2009a); and again FOE 2009, *Subprime Carbon? Re-thinking the world's largest new derivatives market*.

The Kyoto Protocol was compromised from the start, in large part by the position taken by the US, which in turn was heavily influenced by the fossil fuel and automobile industry interests. The European Union had asked for greenhouse gas cuts of 15 per cent by 2010. The US team asked for 5.2 per cent by 2012, got agreement and then refused to sign. The rich nations, it was argued by the US negotiators, should be allowed to buy their cuts from other countries, and to sell the gases they weren't producing to other nations, and that rich nations could buy nominal cuts from poor ones.

In March 2001, with these issues unresolved and no major industrial country yet having ratified the agreement, the Bush administration declared that the Kyoto Protocol was 'fatally flawed', and that it was pulling out (Foster 2001). This represents the end or at least the beginning of the end of a climate accord. Does this matter? I would suggest from a moral point of view it does.

However, there are fundamental flaws with Kyoto and with carbon trading more generally. There is a body of well documented research on carbon trading which is unanimous in its conclusions that carbon trading is ineffective, inequitable, inefficient and unjust and with not only the potential to exacerbate the problem it is designed to fix but effectively delay real action.

Specifically there are problems in the operation of CDMs. For example, the UNFCCC countries 'have been allowed to set their own definition of sustainable development and judge whether a project meets these criteria, rather than adopting a universal definition' (Bond *et al.* 2009: 3). Beyond this, there are numerous documented cases which provide evidence of the abuse of the spirit of the CDM in such a way as to call into question its basic validity (Bond *et al.* 2009; Friends of the Earth 2009; Lohmann 2007). I will return to this shortly.

The first and fairly damning argument against such trading as a solution to global warming, as Lohmann (2008) emphasises, is that it is aimed at the wrong target and does not address global warming. He maintains that to address global warming, we need to keep most remaining fossil fuels in the ground. Instead, as Lohmann argues, carbon trading is built on the premise that

we need to keep the fossil fuel industry going for as long as possible. It is in essence an attempt to maintain business as usual. Its targets are set in easy terms because governments worry about only the short term and in particular the short term effects on unemployment and economic growth if they were to devise carbon trading schemes with real bite. Its horizons are also short-term and narrow in the sense that it is the considerations of each national government with its own national interest that result in no meaningful international agreement on carbon trading. Inevitably while the focus remains on maintaining the *status quo*, no real effort is put into what sorts of structural changes are needed to run future economies in such a way that most remaining fossil fuels can remain in the ground.

There is no evidence to date that emission trading schemes work, even on their own terms. Probably the most successful scheme, or at least that which is most lauded by proponents of carbon trading schemes, is the European Union's Emissions Trading Scheme (EU ETS). However, as the Sandbag Report (Morris and Worthington 2010), by a climate campaign group which, it is to be noted, is supportive of carbon trading indicates, over its five year life to 2012 the EU ETS would result in carbon savings amounting to less than one third of one per cent of total emissions. However, it is more likely that that delivery will have been more to do with the economic downturn of the global financial crisis than the ETS itself.

What the literature critiquing carbon trading reveals is that this is a market solution geared toward not only maintaining 'business as usual' but in fact towards expanding business by privatising perhaps the last remaining commons – the atmosphere. As Lohmann (1999: 13) writes:

[j]ust as in pre-20th century England legal means had to be found or invented to allow landowners full private property rights over land and forests which would allow them to exclude commoners from sharing their pasturage, fuel, and food sources, so exclusionary legal mechanisms are now being formulated to give investors private property rights to parcels of the atmosphere or of forest or plantation carbon. Just as a deskilled,

decontextualized abstraction called "labour time" had to be identified, isolated, and made into exchangeable property during the Industrial Revolution, so, in an equally wrenching, contradictory process, a fiction called "tradable carbon" is today being worked up which is loftily indifferent to the local social, political, photosynthetic, geological, or combustion circumstances surrounding various aspects of the carbon cycle.

While the thesis argues that we cannot expect the forces that created global warming, that is, capitalism, to solve global warming, there may be some who would argue against that proposition and suggest that the market be given a chance. The argument is unsustainable. As Lohmann (2008: np) tellingly argues: 'Prices can do many things, but one thing they have never done is to solve problems that require structural change'. Yet the defenders of the market in this context, despite the Global Financial Crisis, remain true believers. Thus Tickell (2008: 9) arguing in support of Kyoto writes: '[m]arkets are generally the best means of allocating finite resources without unnecessary waste, while keeping as many people happy as possible.'

Rosewarne (2010/11: 32) writes: 'Emissions trading systems are privileged over other forms of market intervention because of a confidence in market processes that presumes trade in carbon permits and offsets will be organised in terms of a perfectly competitive market.' As he then points out, remarkably, 'while recognising the limits of this presumption, both the *Stern Review* and the *Garnaut Review* refuse to question the merits of this conviction' (Rosewarne 2010/11: 32). The existence of perfect markets might be seen by some to be something of a figment of the imagination of neoclassical economists. I would suggest that there have to be dangers in entering a fairytale world if we try to argue that the murky uncertain world of emissions trading schemes could possibly fulfil the very stringent criteria needed for perfect competition!

Despite the inability of prices to bring about structural change, prices can reveal some interesting issues within the market context. Garfield (2008: np)

writes: '[a]t its outset, [EU] allocations [of emissions targets] were largely based on estimates prepared by the corporations themselves, resulting in permit allocation levels that, in some industries, exceeded real carbon emissions by up to 50 per cent. This meant that most companies were not forced to make emissions cuts nor purchase pollution permits.' And what happened? Garfield again notes (2008: np): 'When the extent of the permit surplus became public knowledge, the price of permission to emit 1 tonne of CO₂ collapsed from a peak of 33 Euros to 0.20 Euros'! Further 'between January 2005 and August 2007, emissions from installations covered by the ETS actually rose by 0.8 per cent'.

Compounding the unsuitability of emissions trading schemes is the further major issue of the failure of rigorous regulatory frameworks for carbon trading schemes leading to considerable 'creative accounting'. For example, a company selling carbon credits generated by a tree plantation established in a poor country, can use the 'future value accounting' method (Friends of the Earth 2009; Lohmann 2008) to claim that a certain amount of CO₂ emissions has been neutralised and that this has happened immediately. The reality of course is that this will not occur for several decades – and then only if everything goes as planned. Further, this is a situation that is impossible to monitor. Meanwhile, these same carbon credits can be used by a coal-fired power station in a rich country to continue its pollution (Kenny 2007: 13).

Even more problematical to offsetting are biological constraints. The hydrocarbons taken from deep within the Earth's crust are in a very stable environment where there is little contact with the atmosphere. This is very different from the carbon being stored in trees at surface level – a very unstable environment – where it can quickly re-enter the atmosphere at the point of death of the tree. As Lohmann (1999) says, keeping a tree from dying and the carbon being released into the atmosphere for a century or more, would require forms of biological, political and economic policing unknown in human history. I would submit that an additional problem is the exporting of the problem to a poor, Third World country. In the case of trees being grown to offset carbon emissions, for example, efficiency demands that they are grown

on the cheapest land available, which then is located in peripheral locations, competing with other land (and water) uses and with people with fewer resources and power – no match for rich, powerful, polluting corporate bodies. It is also, in effect, an extension of the ecological footprint of the company/country, and an extension of the principles of colonialism. Furthermore, it does nothing to reduce the carbon emissions at source.

It is noteworthy that some sections of the corporate sector are aware of the fundamental problems of carbon trading. A report by Standard Life Investments on *Carbon Management & Carbon Neutrality in the FTSE All Share* warned that such schemes ‘have the capacity to disguise the failure to achieve actual reductions in overall greenhouse gas emissions’ (Smith 2007: 6). Citigroup’s Peter Atherton has indicated that the EU ETS has done nothing to curb emissions and additionally has acted as a highly regressive tax (Smith 2007). *The Wall Street Journal* in March 2006 claimed emissions trading would make a lot of money for some large corporations but do little about global warming. *Newsweek* in March 2007 (cited in Bond 2007: 8) claimed the carbon trading through the Clean Development Mechanism wasn’t working and furthermore represented a grossly inefficient way of cutting emissions in the developing world. It was argued that the trade is a game which has (by 2007) transferred \$3 billion to some of the worst carbon polluters in poor countries.

A key consideration that I have built into this thesis is that the principle of equity should predominate when considering reparations and funding for renewable technology. This is not going to be achieved through carbon trading or by elite institutions being given the right to yet greater emissions. This leaves us with what I think is the only conclusion possible, that is, that the carbon emissions have to be tackled at the source and the effective transition from fossil fuels can only be achieved through major structural change. Beder (2006: 214) argues that the use of plantations to create carbon offsets occupies millions of hectares of land in poor countries. This further expands the ecological footprint of affluent nations at the expense of other nations, effectively imposing intergenerational inequity ‘by allowing this generation to

park carbon in trees and on paper to meet their reduction commitments, while leaving the responsibility for permanent reductions in greenhouse gas emissions to future generations’.

Lohmann 1999:7 agrees that emissions targets are inequitable:

any measure requiring all countries to reduce emissions by similar percentages, for example, would allow the US to go on producing roughly one quarter of the greenhouse gases released yearly, even though it has only four per cent of the world’s population. Similarly, North-South ‘carbon trading’ suggests that it is legitimate for rich countries or companies who already use more than their share of the world’s carbon sinks and stocks to buy still more of them – using cash which has itself been accumulated partly through a history of overexploiting those sinks and stocks.

Beder (2006a: 214) also argues that the ‘commodification and privatisation of forests can turn ecosystems which some 100 million people depend on for food, medicines, fuel, water and other services into a resource that is owned or managed by corporations for its carbon storing potential’. Rosewarne (2010/11: 48) writes of how ‘the forests of the South are transformed into sequestration sites to help polluters of the North avoid any meaningful engagement in meeting emissions reduction targets’. An equitable approach can only be determined if the people concerned and affected have a genuine say in such determination.

The other worrying aspect of carbon trading is that the ‘players’ in these schemes are not perhaps who one might have immediately imagined. As Walker (FOE 2009: 3) writes: ‘The majority of trade is carried out not by polluting industries and factories covered by carbon trading schemes but by banks and investors who profit from speculation on the carbon markets – packaging carbon credits into increasingly complex financial products similar to the ‘shadow finance’ around sub-prime mortgages which triggered the recent economic crash.’

Walker (FOE 2009: 2) goes on to argue '[t]he credit crunch has taught us that Governments, not markets are best placed to safeguard our future - at this critical point in the fight against climate change, Ministers must step in and lead the way with a new direct approach to tackling carbon emissions'. I would agree that markets are not best placed 'to safeguard our future'. Walker's faith in governments to do so however assumes that they are genuinely seeking to reflect the wishes of the critically informed people and to look to the long term interests of the planet. That faith seems misplaced given the history to date of governments' inaction on global warming in general and, as indicated above and in more detail later in the thesis, the influence on governments by the market and the interests of capital accumulation.

Walker (FOE 2009) is however right to point to the dangers of the trading that is occurring and its dominance by banks and investors. Yet more tellingly Friends of the Earth emphasise the way in which carbon trading has boosted the financialisation of economies in a report they aptly title *Subprime Carbon? Re-thinking the World's Largest New Derivatives Market*. It is worth quoting the relevant comments at some length (FOE 2009: 2):

The buying and selling of carbon is fundamentally derivatives trading. Currently, most carbon is sold as futures or forward contracts, a type of derivative. These contracts contain promises to deliver carbon allowances or credits in a certain quantity, at a certain price, by a specific date. Today's carbon markets are small, but if the United States adopts carbon trading on the scale envisioned by most federal cap-and-trade bills, carbon derivatives will become what Commodities Future Trading Commissioner Bart Chilton predicted would be "the biggest of any derivatives product in the next four to five years".

The report adds (FOE 2009: 4):

Today speculators do the majority of carbon trading, and they will continue to dominate as carbon markets grow. In fact, about two-thirds of

carbon investment funds by volume were not established to help companies comply with carbon caps, but rather for capital gains purposes.

The financialisation of carbon trading is placing the future of the planet in the realm of an unstable, unregulated, speculative, casino economy which has no end other than to make increasing profits for increasingly small numbers of people. Such financialisation has no connection to the lives of the great mass of people, other than to siphon off increasing percentages of their share of the world's wealth. Carbon trading is anti-democratic, given the 'international capital markets [ability to] place serious limits on state authorities to regulate their economies' (FOE 2009: 87).

The idea that the future of the planet might rest with derivatives is truly alarming. Ferguson (2008) reports: 'In 2002, legendary investor Warren Buffett warned that derivatives were time bombs and "financial weapons of mass destruction" that could harm not only their buyers and sellers, but the whole economic system.' He was proved right. Buffett (2002: np) also said: 'The derivatives genie is now well out of the bottle ... Central banks and governments have so far found no effective way to control, or even monitor, the risks posed by these contracts. Closing down a derivatives business is easier said than done. The reinsurance and derivatives businesses are similar: Like Hell, both are easy to enter and almost impossible to exit.' There is little evidence to suggest that these derivatives markets are any more controllable now than then. Yet it is this 'time bomb' that is the financial basis of the carbon trading in which so many governments want to place their faith to save the planet.

What emerges from this discussion of carbon trading as any possible resolution of global warming are several points but most fundamentally three. First, carbon trading is not aimed at resolving global warming; second, the EU's carbon trading scheme, which is the one held up by proponents as the best one to date, is not delivering; and third, the whole process, which is increasingly furthering the financialisation of economies, shows that the extent of learning

from the Global Financial Crisis is minimal. Carbon trading is essentially a tool to further capital accumulation.

Arguments against carbon trading are relevant to Kyoto as already explained in the previous section as carbon trading is the centre-piece of Kyoto. Yet the Kyoto Protocol (and carbon trading) has dominated discussions around finding solutions to global warming. So much time, money and effort have gone into the development and defence of this scheme, it would be foolish to dismiss it out of hand. The problems and uncertainties surrounding Kyoto and carbon trading are such that to place real weight on it as a vehicle for saving the planet would, I submit, be tantamount to global suicide. What is at stake is just too threatening to rely on a process that has problems at both the level of the principles and of operational practice. Yet what has happened since Kyoto, at Copenhagen 2010 and beyond, does tend to make me look back at Kyoto with a certain degree of fondness. Albeit with the important absence of the US, there was some hope, if limited substance, that governments were at least committed to working toward a global agreement on the need to tackle humanity's biggest and most urgent problem. That is no longer the case today.

Since the Kyoto Protocol was signed, there has been an acceleration in greenhouse gas emissions (Hansen 2010; Pearman 2007; Schellnhuber 2008). The rate of CO₂ production has exceeded the IPCC's worst case forecast (Hansen 2010; Lohmann 2007). No nation is decarbonising its energy supply. Most economies are growing and growing numbers of people around the world aspire to the idealised, high consumption lifestyles projected on globalised television programmes. The prices of energy commodities have risen thereby encouraging further investment and exploration in carbon fuels and the rush for oil, coal and gas appears to gather momentum.

There is also the question of the effects of Kyoto on development. In an article titled *The Great Asian Carbon Swindle* (Smith 2008), the merits of the CDM are questioned on two grounds: in its failing first to achieve its objectives of development for Third World countries; and second to act as the carbon emission offsetting it is supposed to provide for an industrialised country. The article claims that 'this market was worth US\$17.5 billion [in 2008], a 200 per

cent increase in market value since 2006'. Some CDM projects not only do not contribute to development; often the recipients are large polluting industries with a negative impact on local communities. As an example it is shown that CDM money is being used to support the palm oil biofuel industry in Indonesia, an industry which has attracted global attention for its devastating impact on Indigenous people's livelihoods and the forest environment. The transparent accounting of offsets in CDM projects is so important. To date too little effort has gone into addressing this issue. Given the scale and scope for fraud with CDMs, it is difficult, if not impossible, to devise a monitoring mechanism that will allow this problem of accountability to be resolved.

The Kyoto Protocol awards rights of emissions per capita on what can only be described as an inequitable basis. The countries awarded the greatest rights to emit are those which are the most *inefficient* users of energy. Australia for example is one of the most carbon inefficient countries in the world in terms of the amount of energy input for the amount of productive input, ranking 109th out of 141 nations.¹⁵ Yet it was granted emissions rights amounting to around 27 tonnes per capita. Countries such as Namibia, Lao PDR, Nepal and Bangladesh, ranked 1st, 5th, 18th and 23rd respectively, received zero tradable rights (Lohmann 2007: 119). These countries have never used the 'carbon sink'. Further if they sought to follow the course of economic development promoted by western neoliberal capitalist institutions, there is now no space or resources for them to do so.

This conclusion however needs to be set in the very specific context of what success might have meant for the Kyoto Protocol. At best, it would have been only a very modest symbolic first step in slowing global warming. Kyoto was aimed at a stabilisation of greenhouse gas emissions at around 5 per cent below the 1990 levels. Its target, even if it were to be successful, would thus fall very far short of the massive cuts in emissions – at least 60-70 per cent¹⁶ - that

¹⁵ www.doingbusiness.org/rankings. Accessed June 2010.

¹⁶ Most of the literature suggests the need for reductions in annual GHG emissions of 60-90 per cent from 1990 or 2000 levels by 2050 for countries listed under Annex 1 in the Kyoto Protocol. Recent research suggests that the reductions need to be 60-70 per cent average for the whole world. Because Australia's emissions are around six times the global average, a contract and converge target for

world climate scientists have repeatedly insisted are necessary to stave off global warming.

Since 1997, a system of carbon trading has usurped the great bulk of the UN's work on climate change. As currently devised, that system rewards the worst polluters and deprives climate friendlier enterprises of both money and human brainpower. It undermines the impetus for regulation, taxation and reduced consumption. It provides a green-wash for climate unfriendly practices. Perhaps most important, carbon trading benefits and empowers mainly those institutions most active in blocking and interfering with low carbon systems and climate friendly industrial change.

Why then is it that the Kyoto Protocol and carbon trading markets (with their links to the bio-fuel and other technological fix industries) are seen as the main solutions to be seriously considered? What has blocked the necessary action? In this thesis I argue that it is the interests of capital and the capital accumulation process that have placed barriers in the way of any real and adequate response to carbon emissions. The power of hegemonic ideology is so deep and pervasive that, even when society is confronted with a human-induced catastrophe, the majority of Western society fails to question a 'solution' which is rooted in the very structure that has given rise to the problem.

3.6 Other solutions

Australia is therefore six times greater than 60 per cent, which means more than 90 per cent for Australia (Spratt and Sutton 2008). This corresponds with new data which suggest a global target of 80 per cent and 95 per cent for developed nations using the principle of "contract and converge". It should be noted that "contract and converge" is not equitable, because the developed nations are responsible for three-quarters of all anthropogenic emissions, have the capacity and responsibility to support developing countries in carbon-substituting technology and resources, and the capacity and responsibility to cut per capita emissions more deeply than developing nations. We are close to or at the tipping point when the Greenland ice sheet starts the irreversible melting that will lift sea levels by five to seven metres, in as little as a century according to James Hansen (2007). At 2°C it will be too late for Greenland, and over a third of species will be committed to extinction Spratt and Sutton (2008).

I have restricted discussion of technical solutions to the realm of power generation – leaving aside problems of carbon emissions from deforestation, land use and transport. This is because each category of emission source has its own complexities, but to some extent power generation is a carbon emitter that is representative of these other sources – all of which arise from a particular economic structure. I will return to land use in Part IV of the thesis which will cover the issue of how the uses of the land under different social relations of production have the potential to reduce carbon emissions from this current source.

There are three broad categories of possible technological solutions to reducing CO₂ from power generation: carbon capture and storage; nuclear power; and electricity generation from renewables such as solar, wind, geothermal, tidal waves and ocean currents. Additionally bio-fuels have been proposed as a partial solution.

Carbon capture and storage (CCS) is a technology favoured by the coal industry. In principle it captures carbon dioxide from fossil fuel power stations, compresses it into a dense liquid and then pumps it deep underground. It differs from other abatement methods in that it does not seek to avoid emissions of CO₂ but to prevent the gas from being released into the atmosphere. Considerable amounts of money are being invested in researching this technology. The United States alone has spent \$3.4 billion in developing CCS technologies (Sourcewatch 2010a). Currently, Australia, Germany, Poland, the United Kingdom, China and Japan are planning carbon capture and storage tests.

CCS is currently experimental, is as yet unproven and has a number of very significant technical problems. For example, the United States would need to provide CCS for the 40,000 oil and gas wells drilled each year in the U.S. alone at a cost that ‘could easily top \$1.5 trillion per year’ (Xie 2008). Additionally, for this number of oil and gas wells, CCS would require the drilling of over 100,000 (and perhaps up to 3 times that number) of so-called injection wells, to inject enough carbon dioxide to keep total emissions at 2005

levels (quoted in Sourcewatch 2010a). The US Department of Energy has stated that the costs and scale required of CCS are prohibitive, as would be the cost of retrofitting existing coal plants with CCS (Ho 2008).

Then there are the geo-political issues, such as monitoring, standards, locations and liability issues (in the event of leakages). Perhaps most problematical in my assessment is the fact that the solution will have to provide secure storage facilities for thousands of years. No one knows if this can be done as it is a completely untried concept.

It is also estimated that it would add 50 per cent to the cost of energy (Li 2008). Li writes that carbon capture and storage, if it does eventually work, will substantially increase the capital cost of electricity generation and reduce energy efficiency. As Trainer (2007: 110-111) argues it will 'take decades before carbon capture and storage is applied to a substantial portion of the world's power plants'.

Thus, there appear to be a raft of unresolved and probably irresolvable issues around this technology. At the very least, their resolution is beyond the timeframe in which we have to reduce carbon emissions drastically.

I have already indicated earlier in this chapter that there is a plethora of information on the costs and benefits of nuclear power. In brief, there are many reasons why nuclear power does not provide an option for future energy, including the radiation risks it poses for human health, of both workers and public, and for the environment. It is a counter-democratic technology, not only through its centralisation of ownership, control and governance, but because of the security issues associated with it. For example, the most lethal radioactive waste needs to be insulated from the environment for 244,000 years (Fig 2009) – a proposition which alone should preclude its adoption, given current global economic and political stability, which may well deteriorate as global warming steps up. Nuclear power is hugely expensive in both building the power station and sourcing its fuel, but also in terms of the opportunity cost of forgoing investment in renewable energies. The experience of Japan as a

result of an earthquake and tsunami in which three reactors at the Fukushima Dai-ichi nuclear plant were seriously damaged in March 2011 is a warning of the types of issues which rule out nuclear power as a viable, sustainable option for power generation.

Fig (2009) argues that nuclear power opens up the potential for the proliferation of nuclear weapons. If one adopts the precautionary principle and the sustainability criterion of maintaining the planet for future generations, the evidence around environmental and safety problems associated with nuclear does not make this a viable option for energy production. Furthermore, uranium is a finite resource which, it is suggested, would be in short supply by 2020, if this option were adopted (Energy Watch Group 2006).

There is much valuable work being done on renewable energies. Heusemann (2003), for example, claimed a recent experiment sponsored by the German government intended to show that a network with 61 per cent of electricity from wind, 14 per cent from solar photovoltaics and 25 per cent from biomass, could meet up to 100 per cent of electricity demand. While wind, wave, tidal, solar, hydro and geothermal power are proven technologies, there are still many questions regarding how much energy such renewables can provide, and what impact the development of such energy systems will have on the environment (for example, the toxic effects of mining rare earths and the amount of land required for positioning windmills, solar panels, and so on).

Jacobsen (2008), a professor of civil and environmental engineering at Stanford University, conducted the first quantitative, scientific evaluation of the main proposed energy-related solutions to global warming and energy security. His study assessed their potential for delivering energy for electricity and vehicles, their impacts on global warming, human health, energy security, water supply, water pollution and wildlife, as well as their space requirements, reliability and sustainability. Jacobsen (2009) found that the options of coal, nuclear and biofuels were getting the most attention and yet were 25 to 1,000 times more polluting than the best available options of solar, wind and water.

While renewables have to be the predominant energy source for the future, there is no possibility that renewables will be able to sustain the high production and consumption lifestyles which characterise western industrialised society. Trainer (2007) authoritatively documents why this is the case. He also points out an additional fundamental reason why the transition to renewables will not enable a continuation of 'business as usual'. Global warming, as this thesis reflects, is not one isolated problem that can be solved by a technical fix. Simms and Johnson (2010: np), in a New Economics Foundation report *The Great Transition*, after reviewing all the existing models proposed for dealing with global warming and energy use (including renewable, nuclear, geo-engineering, carbon capture and storage), maintain that these are 'potentially dangerous distractions from more human scale solutions' and that there are no 'magic bullets' to save us. They conclude that even if we were to transition to an entirely clean energy-based economy, this would not suffice as we are consuming nature's absorption and regeneration services 44 per cent faster than nature can regenerate and absorb them. Simms and Johnson (2010a) argue that what is urgently required is a new macro-economic model that enables humans to live within the constraints of the biosphere. They conclude that global warming is a systemic problem, and it can only be fixed by fixing the system. These arguments are used in later parts of the thesis to support my contention that the capitalist system is the problem and the resolution is not to be found through capitalist mechanisms.

Finally, I turn to the initially much-heralded biofuels. A biofuel is a fuel that is derived from biological matter e.g. biodiesel, biogas and methane. Proponents of biofuels (such as the International Energy Agency), see them as part of the solution to both declining fossil fuels and rising carbon emissions from fossil fuels. However, an increasing number of studies are calling into question the use of biofuels as a solution to fossil fuel production of carbon emissions. Sanderson (2006) reports on studies that compare the energy that goes into making ethanol, expended during the harvesting, fertilising and transporting of corn to refineries, and then refining it, with the energy that is released when it is routinely burned. These show that the net gain is at best small. In another study by Scharlemann (2008), it is claimed that biofuels are not superior if

their production, which results in environmental destruction, pollution and damage to human health, is taken into account. Likewise, Searchinger *et al.* (2008) cast doubt on the claim that substituting biofuels for fossil fuels will reduce greenhouse gases. This is because biofuels sequester carbon through the growth of the feedstock needed to produce them. This study showed that such arguments have not considered the consequences of not counting the carbon emissions that occur as farmers worldwide respond to higher prices and convert forest and grassland to new cropland to replace the grain (or cropland) diverted to biofuels.

There are also grave social justice concerns about the growing use of biofuels - the opportunity cost in terms of food. According to an Oxfam Report (2008) titled *Another Inconvenient Truth: How Biofuel Policies Are Deepening Poverty and Accelerating Climate Change*, thirty per cent of price increases during the previous year was attributable to biofuels, suggesting that these have endangered the livelihoods of nearly 100 million people and dragged over 30 million into poverty. A report by Catanzaro (2008: 7) claims that the growing biofuels industry is expected to consume 400 million tonnes of grain by 2020. Goklany (2011), in drawing on figures from the World Bank and the World Health Organisation (WHO), writes that biofuel production may have resulted in at least 192,000 excess deaths and 6.7 million additional lost Disability-Adjusted Life Years (DALYs) in 2010 due to increased food prices as a result of the growing of biofuels. He suggests these estimates are conservative. Goklany (2011) writes that these estimates exceed the WHO's estimated 141,000 deaths and 5.4 million lost DALYs attributed to global warming.

The 2008 Oxfam report called on governments in the developed world to urgently halt and review their current biofuel policies due to the severe impact they were having on the poor in the developing world and that they were actually accelerating climate change and deepening poverty and hunger. This is because biofuels are causing the price of food to rise. If the fuel value for a crop exceeds its food value, then it will be used for fuel. The report argued that, thanks to generous subsidies and tax breaks, land used previously for food crops was now being used for fuel crops. It indicated that rich countries were

supporting their own biofuel production through targets, subsidies, tax breaks and tariffs – what was described by Oxfam as a new tax on food. Rich countries spent up to \$15 billion in 2005 supporting biofuels while blocking cheaper Brazilian ethanol, which is far less damaging for global food security – though not for the environment.

One clear implication of this is that with respect to the question of land for biofuels versus land for food, there are major distributional effects. It is the poor who are most affected adversely by rising food prices. It is the affluent who will most benefit from biofuels production.

3.7 Conclusion

In conclusion, even if global warming is treated as an isolated and contained issue, which I argue in this thesis is not the case, technical and market solutions would not fix the problem. The theoretical context and analysis of these issues will be addressed in Part III but, as already indicated in the discussion of methodology, the reasoning behind these technical and market solutions rests within the positivist framework. Thus I submit that this positivist thinking provides little more than a description of the problem while precluding analysis that might challenge the vested interests seeking to uphold the *status quo*. The only way of preventing further global warming is to stop emissions of carbon dioxide and other greenhouse gases at the source. That is the biosphere system's imperative for human and other species' survival as we know it. However, the globalised capitalist economy is dependent on carbon fuel and on growth. For centuries capitalism has flourished but at the expense of building a debt to the biosphere which has left us faced with this massive problem of global warming.

International institutional solutions to global warming do not challenge the global economic system, the imperative for this system to continue to grow or the values and lifestyles of a high consumption minority. Yet over half of the world's population live on less than a dollar a day, some so poor they eat mud and sell their children into bondage (Young 2008: 18). In Part II, I will turn to

the study of South Africa, a country which represents a microcosm of the global political economy. This too provides an empirical account of the many strands that are relevant to understanding global warming and its solutions: the imperatives of capitalist political economy; the fossil fuel sector and electricity; the inextricable connection between accumulation and dispossession and the divisions between the ecology and society. While important in their own right in allowing a better understanding at an empirical level of the problems surrounding a capitalist political economy in action and especially those problems around capitalism's continued fostering of global warming, Part II serves to allow me to begin to see how I might use a critical theoretical base to build a theory that is germane to the issues around global warming. Part II thus is more than an empirical analysis; it represents an important source of inspiration in developing the theory sections.

PART II SOUTH AFRICA – A MICROCOSM OF THE GLOBAL POLITICAL ECONOMY

Part II presents a cross-sectional slice through the history of capitalism, based on a country on a continent that has paid and continues to pay the price of being at the periphery of global capitalism and that is already suffering from the crisis of global warming. This 'microcosm of the global political economy' (Amin 1997: np) focuses on the political economy of coal mining and its connections to the expansion of not just the fossil fuel energy sector in South

Africa, but the wider sectors of the South African economy. That in effect means that I am able to adopt the stance taken by Ashman *et al.* (2010: 178) who ‘characterize the system of accumulation in South Africa as a ‘Mineral Energy Complex’ (MEC) where accumulation has been *and remains* dominated by and dependent upon a cluster of industries, heavily promoted by the state, around mining and energy’. Thus Part II throws light on the impact of capitalist expansion and the spread of the growing rift between humans and nature which is resulting in various social and ecological crises, including global warming. This study resonates with the experiences of coal mining, or mining generally, anywhere in the world, with the addition of some local particularities. For South Africa, one of the particularities was the transition from racial to class apartheid at the height of the neoliberal era. Because of the history of struggle against apartheid, South Africa has witnessed a particularly cruel awakening, as former anti-apartheid leaders adopted neoliberal capitalism as the model of political economy, leading to the continued exploitation and oppression of the majority and the formation of one of the most unequal societies in the world of today.

I have drawn for an account of South Africa’s more recent history on a number of sources including Bond (1999), Fine and Rustonjee (1996), Innes (1984), Z. Magubane (2004) and Terreblanche (2002). No history is neutral but Terreblanche’s *A History of Inequality in South Africa 1652–2002* historical account is considered both a seminal work and also unique as he is someone who has witnessed events from a number of viewpoints. Additionally, Terreblanche, an economist, is not a Marxist or from the ‘left’ as is the case of many of the writers I have quoted, but rather a social democrat who believed in a more prominent role for the state in tackling poverty and redistributing wealth. Terreblanche is an Afrikaner academic, formerly a member of the National (apartheid) Party, a writer and founding member of the Democratic Party – one of today’s main opposition parties and which can be described as a small ‘l’ liberal party. Bond on the other hand, provides a Marxist and activist perspective and analysis of the South African transition.

Power and capital accumulation are ever present themes in South Africa's history. Insightful analyses into the roots of South Africa's power base can be found in a number of works including Fine and Rustonjee's (1996) *The Political Economy of South Africa* and Innes' (1984) *Anglo American and the Rise of Modern South Africa*. The latter captures the integral relationship between the South African state, pre- and post-apartheid, private capital and mining and energy, giving an example of the enormous power of the conglomerate, Anglo American, within South Africa's economy. Innes (1984) exposes the power of the mining industry corporations and private capital through the study of Anglo American which has long-running and extensive mining interests in South Africa, including in coal. He writes of the enormous and pervasive economic and political power which is wielded by that corporation in political and financial circles in South Africa and beyond. He argues that the more prominently power displays itself, the less obvious it seems to some that it should be examined. It thus fulfils the Marxist and Gramscian notion of hegemony, of being 'how it is' discussed in the methodology in Part I.

This Part of the thesis is in five chapters. In this first the reasons for choosing South Africa and in turn the South African coal and electricity sectors are presented and the scene set for the study of the South African economy more generally. Chapter 5 covers the relevant and recent economic history of South Africa from 1994 when the first democratic elections were held and the African National Congress came to power. Chapters 6 and 7 turn to the South African economy today with 6 looking at the economy as a whole but seizing on the importance of the electricity sector in that economy, while 7 examines coal more specifically. Part II finishes in Chapter 8 by bringing all of this together to emphasise the pivotal importance of the capitalist system to global warming not only for South Africa and Africa but for the planet.

Part II as it progresses also allows me to consider a developing theoretical framework on which to build the rest of the thesis and address the research question of whether capitalism is able to solve the problem of global warming. This in turn points forward to the theoretical discourse of Part III.

CHAPTER 4 Setting the scene: South Africa and South African coal

4.1 Introduction

I initially chose South Africa to act as a case study while visiting the country for the first time in 2008, and being confronted by the vast seas of impoverished townships of Johannesburg and Cape Town on the one hand and the barbed wire fences and domestic security arrangements of the well-to-do white houses on the other. Every restaurant I visited manifested the divide between the wealthy white minority and the disempowered majority black populations. Thrown into the mix of first impressions were media reports of an energy crisis and the extent of the presence of large numbers of unsupported refugees from throughout the African continent. The situation in South Africa struck me as being untenable – surely the blacks, by far the majority, would not long put up with being the domestic servants and security guards of white masters over whom they had achieved such a magnificent moral and political victory in 1994?

As a former colonial and apartheid country which after political liberation in 1994, was following the neoliberal economic model, South Africa provided a manageable empirical base to explore the question of whether capitalism could solve the problem of global warming. South Africa is a country which captures many of the key issues that the planet is facing with respect to global warming. It has a rich body of political economy literature particularly in relation to the Minerals Energy Complex, energy and the social relations of production, while being empirically a country which is early in the firing line with respect to the effects of global warming.

In my early reading I became more and more convinced that the root problem of global warming was capitalism. I then read amongst other African writers, Samir Amin (1992, 1997, 2006 and later 2009, 2011) who wrote that South Africa is a microcosm of the global economy. It fitted perfectly, illustrating

many of the issues that were relevant to my chosen thesis topic on global warming. Amin (1997: np) described South Africa as: ‘a kind of microcosm of the world capitalist system, which brings together in a single territory a number of features peculiar to each constituent category of that system. It has a white population which, in its life style and standard of living belongs to the ‘first world’, while the urban areas reserved for blacks and coloureds belong to the modern industrial ‘third world’ and the Bantustans¹⁷ (now ex-Bantustans) containing the ‘tribal’ peasantry do not differ from peasant communities in Africa’s ‘fourth world’.

I was fortunate to be able to visit South Africa for extended time periods in 2008, 2009 and 2010, years coincidentally marked by significant developments in the coal and electricity sectors. Also, although it might at first seem unrelated, this period witnessed a dramatic rise in the number of refugees flooding into South Africa and the mounting social unrest - xenophobia - as a result, in part, of this. In South Africa one can see the uneven development, of capital accumulation on the one hand for the benefit of an elite, and impoverishment for the majority and ecological destruction on the other. On one hand are the opulent, gated communities and suburbs, largely for whites, and on the other, the vast townships (or slums), for example of Kayelitsha 20 kms outside Cape Town or Soweto on the edge of Johannesburg. Blacks travel the long distances from the townships on unreliable public transport to clean and provide security for the white areas. The townships were created during the Apartheid years, bringing men off the land or ‘importing’ yet cheaper labour from neighbouring countries, separating them from their families to provide wage labour for the factories of Johannesburg, Durban, Port Elizabeth, Cape Town and elsewhere. Prior to this, during the colonial era, land was appropriated from the inhabitants who became cheap black labour for mining and agriculture. South Africa’s political and economic history during the last 300 years provides a stark study in accumulation by dispossession.

¹⁷ Bantustans refers to the territory which was set aside under the Apartheid regime for black South Africans.

The recent history of South Africa reveals the adoption of neoliberal economic policies in the ranks of the African National Congress (ANC) immediately pre and post 1994 and the acceptance by first President Mandela, then Mbeki and later Zuma, that there was no other way. The shift in macro-economic policy away from some recognition that equity, justice and redistribution mattered, to an enthusiastic embrace of neoliberal capitalism is an extraordinary example of the power of neoliberalism and the corruptibility of the state. The policy, for example, of 'Black Economic Empowerment', conceived in principle as a way to promote black equity in business, in practice has served as another tool facilitating capital accumulation, as well as an opportunity for corruption amongst the new black elite facilitated by their international corporate partners.

The sham that democracy in South Africa has become is summed up in the words of Tinashe Njanji (2010 personal communication), a young refugee and colleague from Zimbabwe, and currently a resident of Khayelitsha:

So far we have had three presidents since 1994, councillors and mayors come and go but nothing changes. We only see them when they want our vote. Our unemployment rate is one of the highest in the world. We have no proper housing or water or electricity, transport or toilets; students are dropping out from tertiary institutes due to high tuition fees and rural youth don't even get to tertiary levels. Youth are languishing on the township streets soon after completing their matric – with no possibility of a future. Most people are still residing in shacks – freezing in winter; cooking in summer.

South Africa is important for the thesis for a number of other reasons. First, it has been described as a two tier economy in which the benefits and burdens of capitalist style development are clearly demarcated. The formal economy is linked into the global economy and has a share in the spoils of the market economy. The informal economy, also inextricably linked into the formal economy through the surplus and highly exploitable labour, is the impoverished un- and under-employed, who live for the main in the outskirts of cities in townships and in rural areas. In reality, South Africa represents a

society with deeply entrenched class divisions which have, in policy terms, been de-racialised since 1994 (with particularly a growing black middle class and a small black elite). It retains however, a strong racial correlation to class divisions. South Africa well demonstrates the notion that capital depends on a reserve army of labour (Ashman *et al.* 2010).

These two tiers or classes represent a microcosm of both the global divisions between the rich and the poor and the potential adaptive capacity of populations to global warming. Those with resources clearly have greater adaptive capacity, at least some options and resilience in the face of global warming; the impoverished and marginalised have no access to adaptive resources and little or no resilience. Yet in a world facing the disruptions that will occur as a result of global warming, what options the latter have are being increasingly eroded as a consequence of the very political economic activity which has given rise to global warming.

Further, South Africa provides a snapshot of the contradictions and processes of the capitalist system and capital accumulation, both historically and in the contemporary neoliberal phase, from the viewpoint of a middle income country which displays the considerable distresses of uneven and ecologically destructive development. I have given particular attention to political and economic power issues, neoliberalism and financialisation, the coal and the electricity sectors, the growing inequality and destruction of the environment, and South Africa's economic expansion and its consequences on the African continent.

Third, South Africa captures many of the contradictions of capitalism that are evidenced in global warming. On the one hand the economy is underpinned by coal as the primary source of energy and the extraction rate of South Africa's vast reserves is being increased for domestic consumption, for the cheap/less-than-cost processing of materials for multinational benefit and for export. On the other hand, South Africa, and Africa generally, is very vulnerable to the impacts of global warming (Christensen *et al.* 2007; IPCC 2007; Toulmin 2009). In addition to the effects on people, South Africa's rich and diverse

biodiversity and the precariousness of this to specific climate niches, provide an early litmus test of the impact of global warming.

Fourth, South Africa is of significance as ironically the cradle of humankind, but also as the site for one of the twentieth century's great liberation struggles.

Finally, South Africa is a country with close historical (particularly in relation to the colonial era) and geographical ties and powerful and influential political and economic links to the rest of Africa.

Having identified these factors as making South Africa a potentially good site for the empirical part of my thesis, I then selected the electricity sector, and within that the coal industry, for study for five reasons: first their centrality to the country's political economy; second, the role electricity plays in South Africa's connections to the rest of (particularly southern) Africa; third their specific and direct causal links to global warming; fourth, the impact the sector has on the country's environment, including but not only, its carbon emissions; and fifth, because of the inextricable entwinement of fossil fuels, capitalism and global warming.

The study of South Africa allows an examination of the capitalist social relations of production and questions whether they are compatible with the preservation of the environment. It covers a broad canvas, encompassing South Africa's environment, geopolitical location, history and political economy. It uses the thread of the coal and electricity sectors, their intersection with the Minerals Energy Complex, state power and South Africa's position in the global industrial capitalist political economy, to flesh out the issues of global warming, development, justice and sustainability. Essentially, the South African study develops in such a way as to allow me to pose the question: is neo-liberal capitalism compatible with maintaining a planet conducive to human habitation?

This section involves qualitative research, using mostly secondary, but some primary sources. The first chapter draws in the main on Statistics South Africa,

and a 2008 United Nations Habitat Report *State of African Cities* for the demographic data and on the IPCC Reports and various African and South African research institutions for the climate change data. The snapshot of South Africa's economic and political history is based primarily on the scholarship of contemporary South African historians and political economists. Chapter 6 uses the work of *Earthlife Africa*, *Benchmarks Foundation* and *Groundwork*, three prominent civil society organisations involved in environmental and human rights advocacy with respect to the mining and energy sectors. Information on coal mining companies and the energy sector parastatals¹⁸ - Eskom and SASOL - is taken from their respective web pages, plus reports in South African newspapers and the online *Pambazuka News*. In addition, travelling through the Western Cape, Gauteng, Limpopo and Mpumalanga provinces (see map below) in 2009, I met and talked to various community members affected by coal mining, health workers and people advocating for communities, either dispossessed by mining operations or suffering the health effects of mining, as well as white landowners opposed to mining because of its impact on the environment, tourism and water.

¹⁸ Parastatal definition: performing a function usually associated with a government and under its indirect control (Macquarie International English Dictionary, complete and unabridged, 2004: 1365). South African parastatals include the Electricity Supply Commission, now known as Eskom; the South African Coal, Oil, and Gas Corporation, SASOL; and the South African Iron and Steel Corporation, ISCOR, which was sold in 1989. While Eskom and SASOL remain parastatals, they operate very much according to the same principles as private corporations – being driven by profit motives rather than by service to the community.

Map 4.1 South Africa's Provinces



Source: http://www.sa-venues.com/maps/atlas/southafrica_provinces.gif

What follows is an account of how the malaise of contemporary South African society developed historically. While far from complete – that would be a thesis in its own right - it provides a context for my examination of the mining and electricity sectors and global warming. Growing out of the history, political economy and the imperative for accumulation, currently there is aggressive expansion of South African corporate investment interests into the rest of Africa. The exploitation of South Africa's mineral wealth by multinational corporations continues. This phenomenon resonates with mining activity throughout Africa and in many parts of mineral rich areas of the Third World.

Just as South Africa's wealth has been built on the country's vast mineral resources ¹⁹ (Fine and Rustonjee 1996; Innes 1984; Terreblanche 2002), much of its environmental destruction has the same source. The South African

¹⁹ South Africa has nearly 90% of the platinum metals on Earth, 80% of the manganese, 73% of the chrome, 45% of the vanadium and 41% of the gold (SouthAfrica Info 2009).

economic and political elite may be geographically, and in terms of power, on the periphery of the global economy, but they are key players at the centre of capitalism in sub-Saharan Africa (Bond 2003; McDonald 2009). Illustrations of this can be found in The New Partnership for Africa's Development (NEPAD) formed in 2001, a neoliberal initiative of the Mbeki government; the spread of a centralised (in South Africa) subsidised fossil fuel-based energy system throughout southern Africa and in the exploitation of cheap and free labour from surrounding countries (McDonald 2009).

This first chapter of the South African study covers the demographics and the economy of Africa as context for South Africa, followed by a similar overview for South Africa with global warming very much in mind in both accounts.

4.2 The African setting

Africa has a land mass of 30 million square kilometres and a population of 1.1 billion people, projected to reach 2 billion by 2050 (Population Reference Bureau 2009). Between 1950 and 2005, the urban population grew from 33 million to 353 million (Boko *et al.* 2007); by 2050 it is projected to be 1.2 billion (UN Habitat Report 2008). Today, less than half the population of sub-Saharan Africa lives in urban areas (Toulmin 2009). Seventy per cent of urban dwellers live under slum conditions, where sharing three toilets and one shower with 250 households in a community is not at all unusual (UN Habitat Report 2008; UNFPA 2010). According to Parnell *et al.* (2010), quoting August 2008 World Bank data, the development context for the majority of Africa's population is unlikely to improve in the short term. This is particularly disconcerting as more than half of the population in sub-Saharan Africa survives on less than US\$0.70 per day. Parnell *et al.* (2010) write that, despite sustained moderate economic growth in much of sub-Saharan Africa, there is a continued rise in urban poverty, inequality and exclusion of the urban poor. Furthermore, the growth that is being achieved is often at a high cost to the environment and to the poor who tend to carry a disproportionate burden when ecological services fail. While poverty is common to both, levels of infant mortality and HIV infection are higher in slum areas than in poor rural areas of

southern Africa (UNFPA 2010). Such factors are significant given the anticipated synergistic impact of global warming on already fragile and impoverished living conditions.

There are 53 nations on the African continent, the majority formerly colonies, and an enormous diversity of languages, cultures and ecosystems. Most people are poor, still relying heavily on natural resources and agriculture and live in countries with very high levels of inequality, and often poor governance structures, all factors which will compound the impacts of global warming (IPCC 2007).

Africa has about 15 per cent of the world's population and only 2 per cent of global trade (Wilson and Abiola 2003). Overall, African countries remain a source of raw materials generally for industrialised economies and of minerals in particular. Many of these raw materials are mined by transnational corporations. There is limited agricultural produce for trade, however, Friends of the Earth International released a report in 2010 *Africa Up For Grabs*, showing that the amount of land being taken in Africa to meet industrialised countries' increasing demand for biofuels is underestimated and out of control. Furthermore, countries and companies are grabbing productive land for growing food for export (SBS 2011).

Sub-Saharan Africa has become increasingly vulnerable in terms of food security – in part as a result of growing aridity, wars and lack of investment and of support for small scale farmers. However, as Bryceson (2002) writes, there are historical reasons for Africa's declining food security which can be linked to the development of industrial capitalism expressed in the processes of de-agrarianisation and urbanisation, factors significant to this thesis and to which I will return in Part IV. Bryceson (2002) writes that the European colonial mission molded the various agrarian, pastoralist and hunter-gatherer groups into peasant²⁰ producers through the imposition of taxes on the one hand and forced land acquisitions on the other. This was followed by the

²⁰ Bryceson (2002) defines the term peasants as rural dwellers who live off the land as farmers and/or pastoralists combining subsistence and commodity production.

building of an agricultural export economy based on cash crops of sugar, cotton, tobacco, coffee, cocoa and so on. The Green Revolution of the 1970s then introduced dependence on fossil-fuel based fertilisers for commercial crops but, with the oil crises in the mid 1970s, peasant commercial agriculture could not compete in global markets. Today, the pressures on rural subsistence agriculture continue with the expansion of industrial agriculture, industrial and mining developments (competing for land), land grabs for biofuel and export food production. This push is part of the neoliberal development agenda and is resulting in the migration of displaced rural peasants into urban slums where they help to swell the ranks of the unemployed and the informal sector.

Africa receives nearly \$13 billion in aid annually (about 4 cents per day per person) but spends more, an estimated \$15 billion annually, on foreign debt repayments (Abbas and Ndeda 2009: 80)²¹. Many African countries have suffered as a result of the growing financialisation of the global economy and the deregulation of the financial sector, with capital flight amounts often exceeding what countries receive in development aid (Boyce and Ndikumana 2010)²². Historical debts in the opposite directions, incurred from slavery, colonialism and apartheid, are not acknowledged by the major state and international institutions (Abbas and Ndeda 2009: 80); nor are the capital flows from South to North from, for example, drug patents of \$40 billion a year (Rosenberg 2002: 28), or the use of the South by the North for the disposal of toxic wastes, a service valued at billions (Ibitayo and Burns 2008). Third World debt particularly affects Africa and has become an inescapable trap for many African countries. It is also a significant mechanism for transferring wealth from the people of the South to financiers of the North according to the Third World Network.²³ In sub-Saharan Africa the ratios of foreign debt to GNP rose

²¹ Sub Saharan Africa's total external debt in 2007 was \$195 billion, an amount equivalent to 25% of the region's GNI (World Bank 2009a).

²² According to Boyce and Ndikumana (2010) sub-Saharan Africa is a *net creditor* to the rest of the world, in that the subcontinent's private external assets exceed its public external liabilities: total capital flight amounts per annum to \$420 billion (in 2004 dollars), compared to the external debt of \$227 billion. Econometric analysis indicates that for every dollar in external loans to Africa in this period, roughly 60 cents flowed back out as capital flight in the same year, a finding that suggests the existence of widespread "debt-fuelled" capital flight.

²³ Between 1980 and 1992, African countries paid three times the original amount of foreign debt owed in 1980 and yet debt still remains at over US\$1.3 trillion (Third World Network 2010).

from 51 per cent in 1982 to 100 per cent in 1992, and of foreign debt to total exports from 192 per cent in 1982 to 290 per cent in 1992, ‘a period during which the Third World debt crisis was allegedly resolved’ (Third World Network 2010: np). The impact of the 2008 Global Financial Crisis on Africa (declining foreign aid, declining primary commodity trade) and South Africa (which experienced a recession and major jobs loss) (Arieff *et al.* 2010) is one indication of the vulnerability of Africa in a globally connected economic system over which they have little input or control.

This is some of the economic and political context for Africa and South Africa in facing global warming.

4.3 Africa and global warming

In Africa, while population has grown from 287 million in 1960 to over a billion today, the continent’s natural resources on a per capita basis have decreased by 67 per cent (Footprint Network 2009), due to growing global resource consumption and the increasing demands on Africa’s raw materials, population growth pressures and the impact of global warming on crop production. Africa’s average ecological footprint per person is 1.4 hectares (Footprint Network 2009), compared to a global average of 2.1. It is also smaller than the 1.8 hectares of bio-capacity available per person within Africa because part of its ecological foot print is consumed elsewhere (it is reasonable to assume as a result of the continuing economic colonisation of land, food, mineral resources and so on). Thus compared to the rest of the world, the average African’s footprint is small. To make vital quality of life improvements, large segments of Africa’s population must have greater access to natural resources.

On food security, much of agricultural production is carried out by unsupported small scale farmers, a sector of society that has been widely neglected by governments across Africa. As a result of the combined factors of lack of support for small scale farmers and global warming impacts, by 2020 food production is expected to decline by up to 50 per cent. By 2050, revenues

from agriculture are forecast to fall by as much as 90 per cent (Boko *et al.* 2007: 435) as a result of global warming. With respect to water, about one quarter of the population (or 200 million people) in Africa currently experience 'high water stress', a figure which could grow to 250 million by 2020 and to 350–600 million by 2050 (Boko *et al.* 2007: 435).

With respect to the Human Development Index and Millennium Development Goals, there is evidence that malaria, which kills about 900,000 people each year in Africa, will, as a result of global warming, move further into southern Africa and resurge in areas such as the highlands of East Africa where it has until now been largely eradicated (Boko *et al.* 2007: 437). The IPCC (2007) states that, given concerns about the impact on disease of climate change, much further research is needed on the potential impact of global warming on dengue fever, meningitis and cholera.

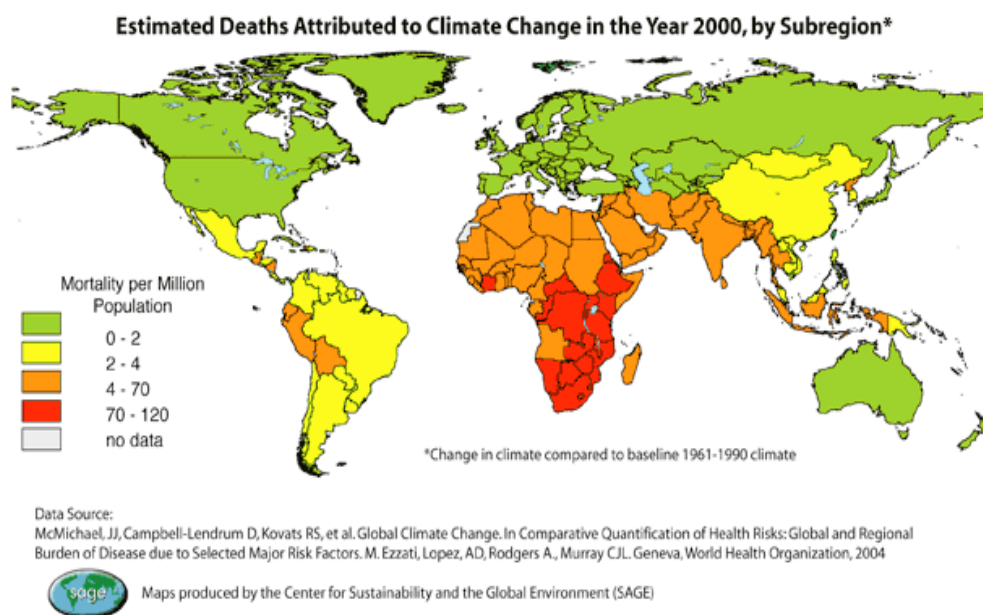
According to the IPCC 2007 Fourth Assessment Report, climate change and urbanisation will interact, with unpredictable effects, but urbanisation and climate change may work synergistically to increase disease burdens (Confalonieri *et al.* 2007). Chapter 9 of the Fourth Assessment Report of the IPCC (2007) states that 'Africa is one of the most vulnerable continents to climate change and climate variability, a situation aggravated by the interaction of multiple stresses, including endemic poverty, complex governance and institutional dimensions: limited access to capital ... infrastructure and technology; ecosystem degradation; complex disasters and conflicts [such that] adaptations may be insufficient to cope with future changes of climate' (IPCC 2007: 435). The report is backed by around 400 peer reviewed papers, all of which indicate, to varying degrees, the critical situation Africa is facing already on a multiplicity of fronts, all of which will continue to be exacerbated by global warming.

From this IPCC Report, evidence indicates the impact of global warming in Africa will vary over the continent. It can however be stated that widespread effects include increased aridity, sea level rises, extreme weather events, coastal erosion, reduced fresh water availability, deforestation, loss of forest

quality, woodland degradation, coral bleaching, increases in the prevalence of malaria and vector born diseases, and impacts on food security causing increasing hunger and malnutrition, and loss of income. One simple example of the current effects of global warming is on women who are walking ever longer distances each day to fetch water, not only increasing the already heavy burden on their lives, but also ‘reducing time for income generating activities’ (Toulmin 2009: 25).

It has been projected that temperatures will increase across the continent between 1.5° and 5.8° C by 2080, an enormous increase which is expressed in the understated terms of ‘leading to increased plant stress and increased risks of drought’ (Toulmin 2009: 24). According to the IPCC (2007), Africa will warm more than one and a half times the global average because of its land mass and particular geophysical characteristics. The consequences of global warming are predicted to be more severe in Africa and in fact African countries are already suffering major levels of warming, with drought and extreme weather events disrupting Africa’s agricultural systems. As Map 4.2 indicates, the heaviest burden of climate change expressed as deaths due to climate change in the year 2000 is clearly sub-Saharan Africa, a situation it is reasonable to predict will become even more marked as temperatures increase. Compounding the physical stresses are the economic models adopted by or forced on to many African countries; the historical legacies of colonialism and resource plunder; the continuing plunder of the continent for resources; land, minerals, biofuels and so on; the neglect of rural and primary sectors and the widespread poverty.

Map 4.2 Estimated Deaths Attributed to Climate Change in the Year 2000 by sub-region.



Source: McMichael *et al.* (2004). This map shows the estimated numbers of deaths per million people that could be attributed to global climate change in the year 2000, drawing from data from the World Health Organization.

Already population and development pressures have taken a heavy toll on ecosystems such as forests and rangelands – leading to loss of biodiversity and land cover, and depletion of water availability through the destruction of catchments and aquifers – factors which will be exacerbated by global warming. An example of the development pressures will be examined further in the vignette on CoAL of Africa’s coal mining in the Limpopo in Chapter 7. In some African ecosystems, an increase in temperatures beyond 1° C will cause significant changes in the distribution of species, their composition and migration patterns. The IPCC (2007) states that numerous organisms in the deserts are already at their tolerance limits, with possibly no further capacity to adapt, particularly in vulnerable areas which includes eastern and southern Africa (Boko *et al.* 2007).

This information must be seen against the background of three key points. First, the African continent has contributed least to carbon emissions, in 2007 just 1 tonne of carbon dioxide per capita per annum. The world average is 4.3 tonnes, South Africa 7.9 tonnes (very inequitably sourced), the US 20 tonnes and Australia now in excess of 20 tonnes per capita (Toulmin 2009: 8).

Second, the countries of Africa most affected by global warming have little political power in the international political arena. Third, the powerless majority such as small scale farmers, herders and fishermen, the urban unemployed and slum dwellers and those employed in the ‘informal’ economy, are doubly disenfranchised at the global warming table, as their interests diverge from their national and continental elites.

While sub-Saharan Africa constitutes a wide diversity of economies and interests, including a division in class interests, there was nonetheless broad unity amongst African nations at the Copenhagen Conference in December 2009, with the exception of South African negotiation leaders. The main concerns expressed by the African contingent were around the Copenhagen Accord’s decision to adopt a temperature increase of 2° C as the benchmark for global warming. According to IPCC analysis, such an increase threatens Africa with catastrophic harm and would mean at least 3° of warming in all regions of Africa (PACJA 2009). Anti-apartheid leader and South African Archbishop Desmond Tutu was quoted as saying that ‘a global goal of 2 degrees is to condemn Africa to incineration and no modern development’ (PACJA 2009: np). Other areas of focus of African disaffection with the Copenhagen meeting were around the ‘hopelessly inadequate’ (PACJA 2009) funding over and above current levels and the lack of any firm commitment to provide such funding; the shifting of the burden of mitigation to developing countries; and the undemocratic and non-inclusive manner in which discussions were conducted.

In light of the dominance of powerful interests in deciding the future of the planet’s climate, the following quote captures some of the voices of those most affected by global warming and helps to put a ‘human face’ to global warming in Africa. It is from the 2010 Pan-African Climate Justice Manifesto (PACJA 2010).²⁴

²⁴ http://www.pacja.org/index.php?option=com_content&view=article&id=36&Itemid=129. np. The quote is long, but I have included it as we so rarely hear the voice of Africans in Australia.

Africa stands on the frontline of climate change. Across our continent, in villages, in towns, on coastlines and deep in the heart of Africa, people battle daily with a growing climate crisis. Our rivers run dry. Our crops turn to dust. Seasons shift and change. The effects of climate change are reflected in the expectant eyes of hungry children. In the lengthening footsteps of women carrying water.

Across Africa, a growing congregation of people suffers starvation and disease while others, after freeing themselves from the grip of grinding poverty, are shackled again by an increasingly hostile climate. It is a cruel irony indeed that a people who have lived for so long in harmony with nature, imprinting the lightest of carbon footprints on the earth are now suffering and living in abject poverty due to the damaging effects of greenhouse gases emitted by developed countries.

The effects of climate change are real, we are seeing the consequences; but they are not of our making. For over two centuries the industrialized world became wealthy by drenching the atmosphere in carbon. They plundered resources from every region of the world. On mountains of coal and oil, they built cities of plenty. In great buildings they constructed while triggering the climate crisis they shelter from its effects. Those left outside are now told seek another path to prosperity, while the sun beats down, or a perfect storm – not of their making – gathers on the horizon.

After 400 years of the colonial ‘civilising’ mission in Africa, followed in the post colonial period by relatively large sums of aid, northern economic advice, reforms which withdrew funding from rudimentary social service infrastructures through structural adjustment programmes and neo-liberal models of development, 80 per cent of Africans still have no electricity, 340 million are without access to safe drinking water, 580 million people do not have access to adequate sanitation facilities (WHO/UNICEF 2008) and massive inequality remains. Global warming is now an additional factor which will compound the many problems facing African people. It has been estimated that already three hundred thousand people die each year – many in Africa - as a result of global warming (Vidal 2009) and *The Lancet* predicted that the loss

of healthy life years as a result of global warming would be 500 times greater in African populations than in European populations (Costello *et al.* 2009).

The situation for many in Africa is desperate. As Toulmin (2009: 8) writes, the ‘poor have few if any options, except risking the sea crossing in a leaky fishing boat from Senegal, Libya or Morocco, in the hope of a landfall in Europe’. Less well-known is that many more will continue to make the long and dangerous trek overland to South Africa.²⁵

This is a snap shot of Africa in a globally warming world. Already, the impact of various disasters on the continent have had an impact on South Africa, one of the most obvious being the movement of large numbers of refugees across South Africa’s borders, some from as far away as Somalia. It is reasonable to project even greater and more complex impacts from the effects of global warming on African countries and this at a time when South Africa itself is experiencing the growing stresses of climate change. I will now turn from the broader context of the African continent to the specific case of South Africa.

4.4 The South African setting

South Africa has a population of 49 million people (Statistics South Africa 2009), eleven official languages and four recognised broad racial categories: black 79.5 per cent, white 9.2 per cent, coloured 8.9 per cent and Asian 2.5 per cent. It is a middle income country with a well-established economy. The GDP annual growth rate since 2000 has been over 4.5 per cent. However, this growth has been achieved without job creation or any distribution of benefits across the society. Today, South Africa’s wealth distribution is very unequal and poverty is of epidemic proportions. The poorest 20 per cent of the population receive only 1.7 per cent of the total income; the richest 20 per cent, 70 per cent (Republic of South Africa 2009). South Africa is now the most

²⁵ I could find no data estimating how many people are currently trekking across Africa to escape famine, drought, water shortages, wars and political persecution. I have met a (small) number of refugees who have made this trek – several more than once – a trek of heroic and often tragic proportions. In 2009, 1000 refugees a day alone were believed to be crossing the border from Zimbabwe to South Africa (Duigan 2009).

unequal society on Earth (Ashman *et al.* 2010), the degree of economic inequality having increased since the end of apartheid in 1994. Official unemployment now stands at 35.4 per cent (Ashman *et al.* 2010). The true figure must be much higher as many in the so-called informal sector, plus many refugees, are not registered as being unemployed. Official figures for unemployment in the 15–24 year age group stood at 48.1 per cent in 2009 (Statistics South Africa 2009). In July 2009, 42.9 per cent of the population lived on less than \$2 a day.

One indicator of the health of a country's political and economic institutions is the health of its people. Life expectancy at birth in 2010 was 49 years compared to 64 years in 1995, the decline largely attributable to HIV/AIDS (U.S. Census Bureau 2010). As the *South African Health Review 2008* states 'extreme wealth inequalities and high unemployment play an important role in poor health' (Bradshaw 2008: np). Health is strongly correlated with socio-economic position, and there is growing evidence that inequalities play a role in poor population health outcomes (Wilkinson and Pickett 2009).

Bradshaw (2008: 51) states:

Despite uncertainty about the exact levels of mortality, it is clear that the health of the South African population has worsened in the last decade. South Africa can be considered to have a quadruple burden of disease, including diseases and conditions related to poverty and under-development, chronic diseases, injuries and HIV and AIDS. Differentials in health status have been observed between populations, wealth and urban-rural groups and education levels.

It is believed that in 2008, over 250,000 South Africans died of AIDS (Statistics South Africa 2009), with the substantial burden (41 per cent) of deaths among 25–49 year olds (Avert 2006). There are an estimated 1.4 million AIDS orphans in South Africa (Avert 2006). There have been claims that the employment practices of the mining industry have contributed significantly to the spread of HIV/AIDS (Cleary 2009; Duigan 2009; Spoor 2009 – personal

communications)²⁶. Diarrhoea and gastro-enteritis have overtaken HIV/AIDS as the biggest killers of children under five years, with the deaths doubling over the previous four years (Bradshaw 2008).

Moving from health to other indicators of the depth of inequality in South Africa, one that is particularly relevant in light of the country's history is that 87 per cent of its land remains white owned. Since its inception in 1995, the Commission on Restitution of Land Rights²⁷ has dealt with only 2 per cent of all restitution claims (String Communications 2009). This problem is compounded both by mining companies' applications for mining rights under a policy framework which favours the mining company (Spoor 2009 personal communication) and by the lack of training and infrastructural support for people returning to the land after a break in land/livelihoods relationships of decades and generations.

Twenty per cent of urban households have no electricity and a quarter have no running water. In rural households, eighty per cent have neither (Magubane 2004a: 658). The response by government to these situations has been very poor. Allegations of political corruption are common²⁸ and the 'corporate capture of government and government officials' (to be explored further in the next chapter) continues (Terreblanche 2002: 97).

Within South African society, there is a growing disaffection with the persistent and deepening poverty and the lack of adequate services such as public transport, water, electricity, housing and health care. Reynolds (2010: np) claims that 'South Africa has more people's protest action per head of population than anywhere in the world – a factor driven by the poor conditions

²⁶ Additionally, large numbers of miners from other countries in the region have contracted HIV/AIDS while working in South African mines – returning home to die untreated in their own communities (Spoor 2009 personal communication).

²⁷ The Restitution of Land Rights Act, passed in 1994 by the South African government, was aimed at addressing the injustices of racially based land dispossession in the past as well as establishing a more equitable distribution of land ownership – land reform being a cornerstone of poverty reduction programmes.

²⁸ Stories of high level corruption in South Africa are frequent news items in the weekly *Guardian Weekly* and daily, *The Cape Times*.

that people are living under without basic services and in the context of the huge gap between constitutional promises and reality’.

In Khayelitsha²⁹, for example, water is a ‘shared tap, sanitation a non-existent luxury and diarrhoea, a constant reality’ (Reynolds 2010: np). Eighty per cent of Khayelitsha residents live in shacks (Thom 2006). Visiting Khayelitsha in the company of members of the People’s Health Movement³⁰, I was shown into a room in a men’s accommodation compound, measuring no more than 3.5 by 2.5 metres. It accommodated four men, of very different ages and unrelated to each other, in bunk beds along with all their cooking utensils, stove and personal effects. There was no electricity or running water. All the men were from rural areas and one, a fifteen year old, said his aspiration was to go to school but he didn’t have the means. When he worked, he had to send money home to his family. He was uneducated, unskilled and faced frequent periods of unemployment. Adjacent to this room were rows and rows of the same, with narrow, muddy alley-ways in between; no recreation space, no community cooking facilities, no laundry, no place to escape the confines of the room. However, this room was at least of substantial construction. There were vast seas of less substantial shacks, small, flimsy dwellings made from corrugated iron, cardboard and bits and pieces. Fires, as a result of the crude and crowded cooking conditions, are frequent. Wires are strung from power-lines to the tin shanties making the many unsafe and illegal connections to the power grid. The poverty is crushing.

Refugees are a significant part of the population of South Africa in terms of not only numbers but also as a focus for violence and frustration in the form of xenophobia, such that they must be included in any overview of South African vital statistics. Furthermore, today’s refugees are an omen of things to come. There will be increasing numbers of Africans making their way across the

²⁹ Khayelitsha is a black township about 10 kilometres from the outer, mostly white, suburbs of Cape Town, with a population of 2 million. By contrast, Cape Town is one of the world’s most beautiful (and rich) cities. Domestic dwellings in the white areas are very spacious, and most have gardeners and domestic ‘char’ women; guard dogs and barbed wire fences.

³⁰ The People’s Health Movement (PHM) is a global coalition of grassroots and health activist organisations dedicated to addressing the burden of preventable disease globally but in particular that carried by developing countries.

continent to South Africa as the impacts of global warming become more intense and widespread. The current (2010 figures) population of refugees in South Africa is estimated to be in excess of 5 million.³¹ These people come from all over Africa, but particularly conflict zones such as Ethiopia/Eritrea, the Democratic Republic of Congo, Burundi and Zimbabwe. Many of these refugees have no documents which enable them to seek work³² (or become part of official statistics) and with little redress to unscrupulous employers who employ people and then fail to pay them. There are no data on this. However, anecdotal evidence from speaking with a number of refugees in different geographical areas of South Africa indicates this practice is common. The use of refugee labour without payment by businesses in the northern Limpopo Region is particularly rife – it is the border where many refugees cross into South Africa. They arrive with little and with few choices for survival. Further south, in Johannesburg and Cape Town for example, refugees exist on the fringes of the poverty stricken townships in a state of insecurity, subjected to constant harassment and the occasional flare up of violent xenophobic attacks. This picture would not be complete without reference to the growing black middle class³³. Statistics are difficult to find.³⁴ However, from an anecdotal perspective, visibility of a black middle class is evident in the media, politics and policy arenas, and new housing estates, but not in many of the mainstream cultural spaces. Politically, however, the significance of the black middle class cannot be underestimated because of their role in maintaining the *status quo*

³¹ Figures for refugees are unreliable – official figures underestimating numbers

³² Refugees need to obtain documents from the Home Affairs Department – an almost impossible task due to the obstructionism and ineptitude of the department (personal experience accompanying refugees).

³³ Middle-class is defined by Statistics South Africa (2010) as: residing in formal housing, having a water tap in the residence, having a flush toilet in the residence, having electricity as the main lighting source, having electricity or gas as the main cooking source, and having a landline or a household member having a cell phone.

³⁴ The percentage of all South African households with a middle-class standard of living increased modestly from 23% to 26% between 1998-2000 and 2004-2006. About 85% of White households and 75% of Asian households had a middle-class standard of living throughout the period. Coloured households with a middle-class standard of living increased from 41% in 1998-2006 to 48% in 2004-2006. Almost no rural African households had a middle-class standard of living. The percentage of urban African households with a middle-class standard of living rose from 5% to 22%. Among middle-class households, white households were much better off than middle-class households from other population groups. In 2006, 73% of white households with a middle-class standard of living reported expenditure of more than R2500 per month, while this was true of only 56% of middle-class Asian households, 53% of middle-class Coloured households and 32% of middle-class African households (Statistics South Africa 2010).

and as evidence that apartheid no longer exists. The position today of the black middle class recalls Fanon's (1967: 122) comments in the *Wretched of the Earth*. Fanon writes:

The national middle class discovers its historic mission ... that of intermediary ... of being the transmission line between the nation and a capitalism, rampant though camouflaged, which today puts on the mask of neo-colonialism. The national bourgeoisie will be quite content with the role of the Western bourgeoisie's business agent, and it will play its part without any complexes in a most dignified manner.

In summary, South Africa remains deeply divided along class lines, in part because of its history, but also in large part, because of the particular political economy structures which are essentially a continuation of the process of capital accumulation of previous governments. The history and politics of this division will be examined further in this part, and discussed in the theory in Part III. Now I will turn to South Africa's ecology and the potential impacts of global warming.

4.5 South Africa and global warming

Southern Africa has an exceptionally rich endemic flora and fauna which, in addition to its intrinsic value, play an important role in sustaining human livelihoods (Von Maltitz and Scholes 2006). South Africa's biodiversity has been identified as being particularly vulnerable to global warming (Von Maltitz and Scholes 2006) because of its degree of adaptation to very specific climatic conditions. There are seven broad biomes³⁵: savannah, nama karoo³⁶, succulent karoo, grassland, forest, desert and fynbos³⁷ (Von Maltitz and Scholes 2006).

³⁵ Terrestrial ecological zones

³⁶ Biomes of the arid plateau of South Africa

³⁷ Fynbos means fine-leaved bush - a local term for the heath-like vegetation found in the southern coastal areas of South Africa that have a Mediterranean-type climate with winter rainfall. Fynbos display exceptionally high levels of endemism. The uniqueness of the Cape Floristic Region, which is largely coincident with the fynbos, has resulted in it being considered as one the world's six floristic kingdoms, the only one located entirely in one country.

Two of the biomes, the fynbos and succulent karoo, have particularly high levels of biodiversity and endemism and climate change according to Von Maltitz and Scholes (2006) is therefore likely to impact on these biomes more severely. They maintain that there is already evidence of a shift eastward with the biomes, and that by 2050, 38–55 per cent of South Africa will have a climatic envelope that does not match any current biome with completely new species groups and wide scale species loss (Von Maltitz and Scholes 2006). One 1999 study referred to by Von Maltitz and Scholes (2006) predicted that the succulent karoo biome would lose almost its entire current distribution, as hotter and dryer conditions prevailed but that each of the other biomes would be affected and would shift and lose species, and that furthermore desertification would increase. All of the biomes are important from a livelihood perspective – particularly the savannah.

There are many aspects to the impact of global warming on South Africa. Here, based largely on the 2007 IPCC Report, just a few are mentioned. It is predicted there that Southern Africa will on average be 3.4° warmer by the end of the century and 1° to 3° warmer by 2050, relative to temperatures during the second half of last century. This increase will vary between regions, with for example, a possible increase of 4.5° in the Northern Cape (of South Africa) during summer (Joubert 2008: 153).

As a result of rising temperatures, South Africa will experience greater frequency and intensity of droughts, floods and heat waves. It will become hotter and drier in the west and hotter and wetter in the east, but with an overall drying due to evaporation (Joubert 2008)³⁸. Rainfall is expected to decline significantly in southern Africa; East Africa (including the north east of South Africa) will become wetter, with rain falling in more intense storms causing greater risks of flooding and damage (with water being largely lost due to run off rather than sinking into the soil). Most regions of southern Africa are expected to experience water stress by 2025 (Das *et al.* 2008) and most farmers

³⁸ The regional Millennium Ecosystem Assessment states that for every 1° C temperature increase, the evaporation rate rises by 5%.

in the region are and will be dependent on ground water for their personal as well as agricultural needs (CSIR 2009). The adverse impacts of global warming on agricultural and other livelihood sources threaten efforts to improve food security and poverty reduction, thereby lessening the chances of attaining the Millennium Development Goals in the region (Nhemachena *et al.* 2008).

In the Western Cape (the south west of South Africa), the 2007 IPCC report predicts falls of winter rain will continue to move southwards toward the pole, resulting in extreme drying in the region during winter – something which will impact greatly on the fynbos and export agriculture, 50 per cent of which comes from this region. Reports have forecast an overall 25 per cent decrease in winter rainfall by 2050. Additionally, ‘season creep’ is predicted, with spring rains being delayed and having potentially devastating consequences for crops and wild seeds (Joubert 2008).

With respect to agriculture, crop modelling predicts that maize, which constitutes 70 per cent of total grain production in South Africa, will decrease by up to 20 per cent within 50 years (DEAT 2007), mostly in the drier western regions. Other crops grown in environmentally-favourable areas are also at risk, as changes occur in both rainfall and temperature. Additionally, there are expected to be detrimental changes in pest diseases in the agricultural sector (Joubert 2008).

The IPCC 2007 Report forecasts sea-level rises of 0.2-0.6 metres by 2100. In addition to the ocean warming, expanding and rising as a result of global warming, there is already evidence of a change in storm frequency and intensity. The interaction of all these factors can give rise to catastrophic results (Das *et al.* 2008). There are already many examples of events that could be attributed to changes in the biosphere as a result of global warming. For example, in March 2007, along the coast of KwaZulu-Natal, sea levels were about 8.5 metres above mean spring tide level, causing widespread damage. From this one event, direct infrastructure damages alone cost in excess of R400 million (roughly \$A67 million) (Das *et al.* 2008). A further

example is found in the evidence from preliminary analysis of fire data from the South African Cape region which suggests that the ‘mean return period of wild fires has decreased from 31.6 years in the 1970s to as small as 13.5 years in the decade leading up to 2010’ (Das *et al.* 2008).

Toulmin (2009)³⁹ suggests that South Africa, as with the whole of Africa, needs to focus on three key areas for adaptation to global warming: food security, water and health. She quotes sources which suggest that an essential part of global warming adaptation is building resilience into ecological, social and institutional systems (Thornton *et al.* 2006; quoted in Toulmin 2009: 30) and that ‘[s]trengthening local, indigenous coping strategies and building on community institutions are key ways forward’. Boko *et al.* (2007: 450) state that ‘[a]daptive capacity and adaptation emerge as critical areas for consideration on the continent’ and that the ‘mix of climate stresses and other factors in Africa means that for many, adaptation is not an option but a necessity’ (Boko *et al.* 2007: 452). They also state that ‘[a]daptation is shown to be successful and sustainable when linked to effective governance systems, civil and political rights and literacy’. In the context of South Africa, as will be shown in the next chapter, these criteria already pose significant problems which will both exacerbate and be exacerbated by global warming.

South Africa, compared to the rest of Africa, is a disproportionately large producer of carbon emissions - emitting more than 40 per cent of Africa’s greenhouse gases from less than 8 per cent of Africa’s population – and with the majority of its electricity produced from coal. Under the Kyoto Agreement, for the period 2008-2012, as a developing country, South Africa did not have any obligation to reduce carbon emissions. South African President Jacob Zuma was party to the brokering of The Copenhagen Climate Accord reached in December 2009 along with the U.S. President Barack Obama, China’s Premier Wen Jiabao, India’s Prime Minister Manmohan Singh and Brazil’s President Luiz Inacio Lula da Silva. The Accord acknowledged the 2° C target as a cap on temperature increases but included no collective target for cutting

³⁹ The Director of the International Institute for Environment and Development, UK.

emissions or a peak year for carbon emissions. Other African and non-African vulnerable countries had been holding out for deeper emission cuts, wanting restrictions on global temperature rises to 1.5° C this century.

South Africa, in concert with China, India and Brazil, has argued it is a developing economy with large impoverished populations and, as such, cannot have restraints placed on its development trajectory. Whether such claims are justified or a guise to allow vested interests to continue “business as usual” including continuing poverty, inequality and exacerbating the impacts of global warming, is examined in the next chapter which explores South Africa’s history and political economy to date and which in turn provides a framework for a contemporary critical appraisal of these claims.

South Africa’s response to climate change will be under close scrutiny during COP 17, the 17th Conference of Parties to the United Nations Framework Convention on Climate Change which started in Durban on November 28, 2011. South Africa is playing a key role in hosting the COP 17 Conference with International Relations and Co-operation Minister Maite Nkoana-Mashabane being president of the summit, and President Jacob Zuma opening it. South Africa is seen as playing a key role because it is seen as hosting the talks on behalf of Africa.

South Africa ratified the UNFCCC convention in August 1997, acceding to the Kyoto protocol in July 2002, although as stated in this chapter, South Africa was not required to undertake any formal, legally binding, greenhouse gas emissions agreements during the protocol’s ‘first commitment period’ between 2008 and 2012.

In 2004, South Africa tabled its first formal government response to climate change with the National Climate Change Response Strategy, which acknowledged that climate change was possibly the greatest environmental challenge facing the world this century, with the African continent confronting greater challenges than the developed world, both in terms of the impact of climate change and the capacity to respond to it.

In October 2007, a draft Long term Mitigation Scenarios (LTMS) report prepared for the South African cabinet, presented five scenarios of future growth paths for

South Africa, each of which involved a different level of greenhouse gas emissions. The scenarios were developed to inform national policy and the country's climate negotiating position in the post 2012 period (Hallowes 2008).

Business as usual, or 'growth without constraints', provided the high end scenario in which emissions were projected to rise dramatically. Under this scenario, projected growth would lead to an almost fourfold increase in emissions, from 446 million tons of CO₂ equivalent in 2003 to 1,640 million tons by 2050. This was followed in descending order of development and emissions scenarios, until the fourth low growth path scenario which was described as that required by science - different from the other three scenarios as it included a particular climate target, that is reduced emissions by 30 to 40 per cent from 2003 levels by 2050.

The Zuma government in principle agreed to an emissions trajectory which would see emissions (theoretically) peaking between 2020 and 2025, with upper limits of 583 and 614 million tons of CO₂ equivalent respectively, then plateau for up to 10 years and decline in absolute terms between 2036 and 2050, to somewhere between 212 and 428 million tons of CO₂ equivalent.

At COP15 in Copenhagen in 2009, Zuma negotiated on the basis of these figures, however, making them conditional on financial and technical assistance from the rich nations.

Further muddying the waters on South Africa's position *vis-a-vis* COP 17, South Africa's Environment Minister Edna Molewa stated just four months prior to the conference that her government was continuing with its target of a 34 per cent reduction in emissions by 2020 and 42 per cent by 2025 relative to the country's 'business as usual' trajectory - (Groenewald 2011), a development trajectory which the government is further locking itself into with its World Bank loan for coal-fired power station expansion (see chapter 7). In addition to this coal usage trajectory, South Africa continues to pursue nuclear energy (Greenpeace August 2011).⁴⁰

Bond, in his latest edited book, *The Politics of Climate Justice*, to be released during the COP 17 meeting, brings a clarity to South Africa's climate position. He writes:

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[i]f President Jacob Zuma's government really cared about his closest historical constituencies in rural KwaZulu-Natal villages, who are amongst those most adversely affected by worsening droughts and floods, then it would not only halt the R250+ billion worth of coal-fired electricity generators being built by Eskom at Medupi and Kusile. The state would shut the world's single largest CO₂ emissions source, Sasol's Secunda plant which makes oil from coal, and also reverse the R80 billion heavy oil refinery authorized for construction at Coega, north of Port Elizabeth. It would reverse its trillion-rand nuclear energy fantasy and also deny approval to 40 proposed new coal mines in Mpumalanga, Limpopo and KwaZulu-Natal allegedly needed to supply the plants and export markets in coming years on grounds that – just as at the Cradle of Humankind northwest of Johannesburg, which is suffering threats of debilitating acid mine drainage – these will cause permanent contamination of rivers and water tables, increased mercury residues and global warming. Pretoria would offer a Just Transition package to all affected workers, transforming their thousands of lost jobs in fossil fuel industries into employment in renewables, public transport, building refurbishment, appropriate production and disposal, reformed agriculture, healthcare and education, as demanded by labour, environmentalists and communities in the Million Climate Jobs campaign.⁴¹

Bond (2011a) maintains that key South African and global elites are incapable of reconciling the threat to the planet with their economies' addiction to fossil fuels. Other chapters in Part II of the thesis support the claims that the South African government is doing little to mitigate climate change.

In conclusion, this chapter has attempted to present a broad perspective of this critical moment in African and South African history. The chapter has indicated that there are a number of factors - the expansion and deepening of the capitalist social relations of production, food crises, water crises, capital flight, unemployment, burgeoning city slums, poor governance, de-peasantisation and rural poverty – which will act synergistically with global

⁴¹ See also my chapter The Politics of Climate Change in South Africa in Bond 2011a - to be published at COP 17.

warming, compounding the burdens already borne by the majority of Africans and South Africans today.

CHAPTER 5 South Africa's background

5.1 Introduction

There is an extensive body of scholarly work written on South African political and economic history. I have therefore chosen to focus on particular writers and commentators whose work brings context to issues germane to the political economy of global warming in South Africa. This provides an understanding of how South Africa's economy has developed in the post-apartheid era against the interests of the majority of South Africans. This issue and period are crucial, given the imperative for an African country which needs both to follow and to promote, throughout sub-Saharan Africa, a sustainable development pathway in the context of global warming. The years of colonial settlement of South Africa, while laying the foundation for inequality, poverty and ecological destruction, are given less attention.

5.2 The period prior to democracy in 1994

Given global warming and the potentially catastrophic effects it will have on the country, it is ironic that South Africa's history and archaeology link the people of today to the first human societies on the planet. South Africa is known as 'the cradle of humankind' after Charles Darwin deemed it as such and is testament to the fact that the country had the environmental conditions suitable for the development of the first human societies.

Both the province of Mpumalanga and the area of the Limpopo province known as Mapungubwe, which are the principal locations for this study, have extensive evidence of human history that dates the lives of the first humans and their ancestors back many millennia (Delius 2007). The latter area was the centre for trade in southern Africa between 1200 and 1300 AD. Evidence exists in a number of locations in South and southern Africa of the San people (or

Bushmen) who were hunter-gatherers from around 100,000 BC, and of the Khoikhoi people who came later and were agri-pastoralists. By 500 BC, Bantu (and other language) speaking peoples were migrating into the south of Africa and by the time of the first European settlement, there were many different language groups in the region (de Wit 2007).

South Africa is one of the many African countries which were colonised by Europeans from the 16th century until the independence movements of the twentieth century (with Ghana being the first colony to gain independence in 1965). The fifteenth century saw discoveries of South Africa by Portuguese navigators Bartholomeu Diaz and then Vasco da Gama, but it was not until the 17th century that Dutch farmers, Islamic leaders deported from what was Batavia, and French Huguenot refugees, along with imported slaves, began settling in southern Africa and requisitioning land from the Indigenous peoples. The Dutch, closely associated with the Dutch East India Company, became known as the Afrikaners. From these roots emerged the Boer trekkers who moved to the interior, appropriating land and engaging 'in rentier exploitation, living off rents in labour and in kind extracted from indigenous peoples whose land they had seized' (Marais 2001: 8).

The discovery of diamonds in the Kimberley in 1867, and gold in the 1880s, led to a rapid expansion of British influence, as the British, who had been content with control of the coastal regions for geopolitical reasons, now saw South Africa as a potentially huge capital asset. Bond (2003) gives an example of the long and intimate marriage between imperialism and finance in South Africa's geopolitical history, writing of how the power and vision of finance were engaged in the deepening of colonialism in South Africa. Accompanying the flows of capital to the diamond fields, Britain effected the complete subjugation of African kingdoms during the 1870s, as well as the invasion of the Afrikaner Transvaal Republic in 1877. The discovery of gold and diamonds and the resulting influx of (mostly British and particularly Rothschild's) capital (Bond 2003) were the beginnings of what became the central minerals energy complex (MEC) in South Africa.

The early developments around mining fostered the ‘integration of [the] South African economy into the world economy as a source of primary commodities’ and set the ‘pattern of labour and social relations that would become the definitive feature of South African society. Capital accumulation would be based on the exploitation of a low-wage, highly controlled expendable African workforce which was to be reproduced in a system of ‘native reserves’ at minimal cost to capital’ (Marais 2001: 9). This workforce was drawn from the whole of Africa; in fact, until the 1970s, it included more non-South African than South African workers (Marais 2001).

The expansion of industrial capitalism into the mining and agriculture sectors in South Africa in the eighteenth and nineteenth centuries resulted in serious divisions in society, including the racial division of labour and the marginalisation of black African communities who were increasingly forced to move to more marginal land and eventually into Bantustans during the apartheid era. South Africa’s economy, even during the 19th century, contained early tensions between the interests of mining capital and those of agricultural and industrial capital, the former preferring ‘free trade’ policies and the latter the protectionism and subsidies of the state (Marais 2001: 9). Each of these sectors required cheap labour and, for the agricultural sector as it became mechanised, increasing areas of land for farming. Van Onselen (1996), in *The Seed is Mine: The Life of Kas Maine, a South African Sharecropper 1894-1985*, documents the very considerable social and economic hardship this caused the black farm-labour tenants and sharecroppers. By the 1950s, a comprehensive system of labour control measures had been introduced, including pass laws, labour bureaus and single sex living quarters - all part of a comprehensive approach to providing cheap and docile labour for Afrikaner agriculture and industry (Terreblanche 2002). It is of note that the gradual removal of the dispossessed black population from white farming resonates with Marx’s descriptions of the enclosures of the commons and the consolidation of landholdings in England in the 16th and 17th centuries. In the South African context, however, there were additionally systematised racist dimensions to the deep class divisions which became increasingly entrenched in everyday life, as well as in the political and economic structures of the

society. Callinicos (2009) argues that a theory of imperialism explains these racist dimensions. Firstly, racism legitimised European colonialism and the integration of the global South into the world economy as a supplier of agricultural products and raw materials which required coerced labour; and secondly, racism allowed the expropriation of land, the spread of indentured labour, various taxes and other extractive and inhumane practices.

‘The Afrikaner Nationalists’ very public pursuit of apartheid, of racially sanctioned avarice and greed’ and the ‘racial bigotry and double standards [wherein a] black man was damned by his success if he worked hard and damned for his laziness if he failed’ (Van Onselen 1996: 311) became deeply entrenched in South African society. These racist divisions gained full expression with the victory of the white supremacist Afrikaner National Party in 1948 and thereafter the implementation of apartheid policies. These led to a systemic hardening of the race/class divisions and of labour exploitation and land expropriation that had begun with European settlement. One far reaching apartheid policy was that which underpinned the creation of Bantustans, whereby 13 per cent of South African land (the most marginal) was demarcated for the majority (80 per cent) black South Africans. This policy has significance for the sustainability, food security, human development and mitigation strategies for the communities of people living in these areas today. The homelands were overpopulated with the ‘resettled’ black population – the reserves of cheap labour. Much of this land has since been found to overlay various rich mineral deposits, a factor which is relevant to the accumulation strategies in South Africa in the 21st century.

According to Terreblanche (2002), the three threads to South Africa’s history over the last three centuries to 1994 are white political and economic supremacy; land dispossession; and the exploitation of labour. It is clear that these themes continue to have repercussions and further expression in the 21st century. To this can be added that South Africa demonstrates a system of accumulation which has been very heavily influenced by the financial sector and which has laid the foundation for today’s close alliance between finance, mining and energy. The particular system of accumulation that developed in

South Africa occurred around the MEC (Fine and Rustomjee 1996), a system built on a core set of industrial sectors which developed very strong linkages with each other and which have dominated the course of economic history in South Africa through to today. Fine and Rustomjee (1996) argue that the MEC not only exhibits the characteristics of conglomerate behaviour within that sector, but effects control over other parts of the economy through its influence over the financial sector and through linkages to both state and private capital. South Africa clearly has exhibited and continues to exhibit the definitive relationships of capitalism, that is, the exploitative division between labour and capital and compounded by the division of race. However, in looking at another definitive aspect of capitalism, that is the competitive relations between the individual types of capital that control a society's productive forces, the fragmentation, competition and division that normally exist in the capitalist system are not so evident in South Africa. The linkages between the MEC and other sectors – both state and private – have been consolidated through 'ownership and control, through relationships between state and capital or through the imperatives of apartheid' (Fine and Rustomjee 1996: 92). (When below I move to consider the post-apartheid era, the particular characteristic of these linkages appears to have continued, while at the same time, the class divisions not only remained but widened and consolidated through the imperative of capital accumulation.)

One other thread common to South Africa's geo-political economy history since the late 1870s that is of particular relevance to this study, is the relentless degradation of the environment which accompanied the subjugation and exploitation of the de-peasantised and proletarianised population. Van Onselen (1996) captures a part of this painful process in *The Seed is Mine*, as he recounts the life and times of Kas Maine, a black South African who struggled to eke out an existence under conditions that prejudiced his every effort to secure land for sharecropping in an environment which privileged whites and dispossessed blacks. The background for Kas Maine's story is one in which large numbers of blacks were increasingly being forced to leave the land to work as cheap labour in the mines in the period covered in this book from the late 1890s to 1985.

In summary, from the perspective of accumulation and the entwined issues of equity and the environment, up to 1994 South Africa developed as a country with a heavy reliance on minerals and energy related capital intensive production (Fine and Rustonjee 1996); with growing surpluses of unemployed, mainly black, workers (Bond 2003); with extremely uneven development; with a strong and powerful financial sector; and as a powerful sub-imperial power on the African continent. It is to the contemporary period that I will now move to set the more current context for the issue of global warming and South Africa.

5.3 Immediately pre 1994

The success of the African National Congress - the ANC - in coming to power after the first post-apartheid democratic elections in 1994 and the first black presidency of Nelson Mandela, brought a sense of hope for freedom from racial, political, social and economic oppression to the majority of the black population in South Africa. It also inspired not just liberation movements worldwide, but the international community. Judd (1996: 411) describes the fall of apartheid as ‘one of the last and, arguably, one of the most dramatic and moving transfers of power within a country which had formerly been ... within the British Empire and Commonwealth’. However, one has to ask whether there was a real transfer of power, other than the addition of a new black elite at the table. Certainly, the ‘face’ of political power at the top levels changed but evidence supports the argument that the economic power remained with the Afrikaans-dominated financial sector and, more specifically, the MEC.

Innes (1984) writes that to know how the South African economy functions, we first have to know the conditions and extent of the power (of a corporation such as Anglo American), what form it takes, how it works and what its limitations are. He reveals how Anglo America was and remains actively involved at a number of levels in influencing the direction of political change in southern Africa, and the continuing development and expansion of capitalism in South and southern Africa. He argues that the transition to

monopoly capitalism in South Africa also produced the phenomenon of South African imperialism during the 1960s and 1970s, a time when the process of monopoly transformation in South Africa reached new heights (Innes 1984: 239). This expansion of South African imperialist tendencies in Africa has continued in the post-apartheid era and, of particular relevance for this study, not only, but including, on the back of expansion of the electricity sector.

Innes' theme of the enormous power of one company, Anglo American, is taken further to the whole minerals/energy sector by Fine and Rustonjee (1996). In their seminal work in which they coin the concept of the minerals-energy complex (MEC), they spell out its centrality to the South African economy. In another paper, Fine (2008: np) describes the MEC as 'a system of accumulation, centred on core sectors that has a character and dynamic of its own that was far from pre-determined [and] can be traced back to the emergence of mining in the 1870s through to the present day'. The MEC has played a central role in structuring electricity power relations in South Africa and the country's policy position in relation to coal, the energy sector and, not by default, macroeconomic policies and actions in relation to global warming. It has become central to any contemporary critical analysis of the South African economy as it sits at its core, not only by virtue of its weight in economic activity but also through its determining role in the rest of the economy. The MEC is used in the thesis to describe in effect where political and economic power lie in South Africa and how it has been hugely influential on the shifting role of the state.

With the safeguarding of positions of large-scale private capital, as well as the apartheid regime's frenetic pressure and campaigning during the pre-1994-election period, to those who might have feared a major shift in economic power post 1994, the *status quo* appeared relatively secure at the time of the transition. Additionally, the civil service and key posts in ministries by the 'old guard' in areas such as economic affairs, mining and energy, meant any progressive changes faced entrenched, systemic resistance.

The external forces of history were also pitted against any major shift of power during South Africa's historical transformation from apartheid state to democratic nation. As Magubane (1979) proposes, an understanding of contemporary South African inequality and political economy requires it to be placed within a wider political economy matrix, which takes into account the inequality between, on the one hand, advanced capitalist countries and, on the other, South Africa. The former have benefitted from capital accumulation drawn from the colonies, enabling their industrialisation, while fostering underdevelopment and impoverishment in the colonies. For Magubane (1979), imperialism, colonialism and the development of capitalism are the pegs on which an understanding of South African race, class and contemporary society can be hung. In arguing this, he highlights the importance to contemporary South African society of European settlement and cultural domination, the migrant labour system upon which the MEC was developed, and the appropriation and exploitation of South Africa's (and more widely Africa's) human and natural resources.

It is of note that there has been a deliberate obfuscation of class and the class struggle in contemporary South African political analysis both by the ANC and by the dominant global institutions. As Magubane (1979) argued in the apartheid years (but it remains true well after that time) there was a reluctance to criticise a political elite when that elite is black.⁴² Prior to 1994, the ANC policies promised socialism and African unity (Bond 2000; Magubane 2004; Terreblanche 2002). Before the 1994 election, however, the ANC had dropped some of its policy planks, such as nationalisation of large scale industry and sweeping government redistribution of wealth from whites to blacks. In retrospect it is thus clear that neoliberal pathways to development were in the minds of at least some of the ANC leaders prior to 1994. In fact at that time, even COSATU (the Council of South African Trade Unions), then one of the world's most militant trade unions, endorsed the General Agreement on Tariffs and Trade, effectively removing trade protection and leaving small newly

⁴² The death of Nelson Mandela will perhaps mark a point of departure for many from the ANC which has not delivered on its pre-1994 promises.

developing industry exposed and vulnerable. Terreblanche (2002: 101) explains this shift as being

due to the extraordinary capacity [of the corporate sector] for propagandising and myth-making [which] enabled it to convince ANC leaders ... that the corporate sector [was] the *deus ex machina* that would solve all social problems of poverty, inequality and unemployment. It said it could do so provided three preconditions were met: first, South Africa should be democratised; second, the corporate sector (and with it, also the power and property relations of the South African economy) should be left intact, and granted all the freedom ... normally granted to a corporate sector in a genuinely liberal-capitalist system; and third, a neoliberal macroeconomic and export-oriented policy should be implemented in order to integrate South Africa into global capitalism.

In turn, the corporate sector promised 'that if its role in the economy was left intact, it would deliver the jobs, taxes and improvements in living standards' desired by the ANC (Terreblanche 2002: 103).

While it was under public gaze and the pre-1994 political negotiations were taking place for the transition from the apartheid regime to free and inclusive democratic elections, the ANC leaders were wined and dined, flattered and cajoled from morning till night by the captains of mining, industry and banking (Bond 2000; Terreblanche 2002). The corporate sector and the IMF were able to pressure the ANC on the economic directions being taken. Terreblanche (2002: 102) argues that the corporate sector was a 'major player' in the negotiations around the transfer of power from the apartheid regime to majority rule, 'boxing in' the ANC. It was in 1993 that Mandela and the ANC made a concession to the cornerstone of neoliberal economic development policy, as it was promoted by the IMF and the World Bank in middle and low income countries – the Structural Adjustment Programmes (SAPs). These included free movement of capital, free trade, privatisation and in general a heavy reliance on the market which in turn meant low taxes and less interference by

government in the market, which more deeply tied South Africa into the neoliberal development path, further impoverishing the poor majority.

Importantly, there was a lack of technically competent economists within the ranks of the ANC (Terreblanche 2002). It was thus relatively easily persuaded that, if it did not follow a neoliberal road, all hell would break loose in the markets and this would place the whole transition process at risk. At stake was the future political and economic direction of the country. Given the comparative wealth and position of South Africa relative to all the other African countries, this direction, including its ideology, was crucial to the corporate sector and the international institutions of global capitalism. During the years of the apartheid regime, the country had suffered a period of prolonged stagflation, in part due to international trade boycotts, but also as a result of the unevenly structured economy. The corporate sector was then focussed on finding a 'new accumulation strategy' (Terreblanche 2002: 95) from both the global economic arena and the African continent.

According to Terreblanche (2002: 96), the main characteristic of this strategy was 'that the supreme goal of economic policy should be to attain a high economic growth rate, and all other objectives should be subordinated to this'. This resulted in the ANC in 1993 abandoning its previous policies of redistribution and poverty alleviation. The Transitional Executive Council, an initiative of the ANC to oversee the transition, signed a confidential protocol with the National Party and the corporate sector on economic policy, before accepting a secret \$850 million International Monetary Fund loan to tide the economy over (Bond 2000). The protocol committed the ANC to a neoliberal, export-oriented economy with a strategy of 'redistribution through growth' (Terreblanche 2002: 96). It was trickle down capitalism.

Bond concurs with this account of this critical period, writing that the power of white English-speaking business rose during the 1990-94 negotiations in a period that included South Africa's longest depression, from 1989-93. In late 1993, the ANC put the final touches on the 'elite transition' to democracy. Bond continues:

[the] long-standing ANC promises to nationalise banks, mines and monopoly capital were dropped [April 1992]; Mandela agreed to repay \$25 billion of inherited apartheid-era foreign debt [October 1993]; the central bank was granted formal independence in an interim constitution [November 1993]; South Africa joined the General Agreement on Tariffs and Trade on disadvantageous terms; and the International Monetary Fund provided a \$850 million loan with standard Washington Consensus conditionality (Bond 2010: np).

5.4 Post 1994

In January 1995, the process of privatisation began in earnest with the abolition of controls over the South African exchange rate. This was followed by the raising of interest rates to a record high. Further, between 1998 and 2001, the ANC government granted permission to South Africa's biggest companies to move their financial headquarters and primary stock market listings to London, resulting in a large outflow of financial capital leaving the country. Between fraudulent activities by banking and stock-broking officers, false trade invoicing, debt swaps, transfer pricing to shell companies by major conglomerates with a presence in South Africa (Bond 2000) and various other nefarious activities, capital flight from South Africa was significant during the 1990s. This generated unprecedented profits, at the same time robbed South Africa of much needed capital and resulted in a 'cataclysmic drop' in the value of the rand (Bond 2000). While there is much detail in relation to the scurrilous financial and mining sectors' activities during the transition period 1994–2000 (see in particular Bond 2000), the main point for this thesis is that the ANC leaders failed to protect the interests of those, the majority, they were chiefly elected to serve. This was accompanied by a voraciousness of greed by the economic elite and, conversely, a complete lack of loyalty and commitment to the majority by the most powerful players in forming the new economic directions of the country.

At the time of the ANC democratic victory in 1994, the West welcomed South Africa back into the international fold of democratic nations. A year after its election and under pressure from domestic business, the World Bank and the IMF, the ANC came to accept privatisation in principle and dropped talk of regulating foreign investment. The government gradually eliminated measures to protect the currency and implemented some facets of trade liberalisation even faster than required by its commitments to the WTO (Fine 2008). This again accentuated existing inequalities and poverty.

Carnegie (2007) writes of the impact of the global spread of financialization on South Africa since 1994 and how this has negatively impacted on the country, serving the growth and dominance of the financial sector and rentier interests. Carnegie (2007: np) writes that the ‘internationally hegemonic neoliberal discourse and [South Africa’s] sub-hegemonic domestic financial interests’ ensured monetary policies which favoured the expansion of the ‘financial sector over the interests of South African labour and industry’. Such policies, according to Carnegie (2007), not only created short and long term instabilities in the economy, but increased inequalities in an already seriously divided country. A part of this neoliberalisation and financialisation of the economy, in more recent years since 1994, economic growth has been driven by consumption and debt creation without sufficient investment and building of infrastructure and productive capacity, thus entrenching benefits of the financial sector while increasing the country’s economic liabilities, with consequences for the majority population and the stability of the economy. Ndikumana and Boyce (2002) argue that there is a strong correlation between the availability of credit to the private sector, capital flows and capital flight, trends which have been apparent in other southern African nations, and very probably could be shown also for South Africa.

In a sense, Terreblanche (2002) claims, the ANC got what it wanted – political control- while the corporate sector got what it wanted - continued control of the economy, the latter at least with the added advantage that South Africa was no longer the subject of international trade embargoes. All of this took place against the background of wider events: the global power shifts (including

ideological shifts) between the communist block and the West, the hegemonic power of the neoliberal ideas proposed by the Washington institutions and Western governments and the loss of material support for the ANC from the Soviet Union.

Africa is often portrayed as an economic 'basket case', a continent plagued by corruption, poor governance, underdevelopment, violence and poverty. South Africa, by comparison, is held up as one of the more successful models of development in sub-Saharan Africa. It is treated by the West as a key link to other sub-Saharan African countries. It is able to project the aspirations of southern Africa by being seen to be in concert with Western ideological imperatives. This is true for the minority, the middle and upper class which is overwhelmingly white but now includes a 'black elite'.

One can ask why there might have been any belief in the ANC that neoliberal policies would deliver what they had fought for in the apartheid years. The conflation of economic freedom (expressed through trade, private ownership, the free movement of capital, but not labour or basic economic security) with political freedom has always been a cornerstone of neoliberal ideology and a fundamental condition for profitable capital accumulation. As was wholly predictable, the practical policies arising from this political ideology as adopted by the ANC have given rise to growing inequality and continuing poverty in South Africa.

In 2001, a policy statement from COSATU (2001: np) reflected unease with this strategy and its consequences:

In contrast to ... political progress, in socio-economic terms the legacy of Apartheid remains entrenched and, with the massive loss of jobs in the past decade, even appears to be worsening. Wealth is still concentrated in a white minority. The nature of capital remains largely the same – concentrated in the mining–finance complex, which continues to dominate the commanding heights of the South African economy. Serious inequalities persist. Almost half of the population lives in poverty,

including many of the employed – the ‘working poor’. Unemployment and under-employment are on the rise. The complex nature of the transition [has] emerged in deeply contradictory government policies.

The people’s successful struggle against apartheid made South Africa a potentially remarkable society, a rainbow nation of people who had fought for and seemingly won freedom from oppression and exploitation. However, the adoption of the neoliberal capitalist model of development has turned South Africa into yet another competitor in the global market place with a government which increasingly lacks legitimacy. At the same time as it is unable to provide basic services, such as adequate water, housing, electricity, healthcare and education to many of its constituents, it exhibits a pervasive lack of due process in its bureaucratic and political functions. The model of development adopted by successive ANC governments and the policies implemented, indicate that, whatever degree of influence South Africa’s particular history has on contemporary society, the ruling class, black and white and the MEC together with transnational mining corporations, benefit enormously from the current structure and ideology of the economy.

The vast majority who fought for liberation and independence from a race-divided society remain part of a class that is marginalised and impoverished, the unemployed who constitute the ‘informal’ sector. Juxtaposed to this are South Africa’s new black political elite who are now the protectors of corporate investments, private property, law and order. The 2010 World Cup was something of a metaphor for South African politics: US\$9.6 billion spent on World Cup infrastructure while one third of the population live on less than \$2 a day (World Bank 2010), lack adequate shelter, food, water, health and education, with many of the one third having their stalls and shacks removed to make way for soccer stadiums, thereby presenting a clean and progressive image to the international media.

To facilitate the development of neoliberal economic policies in South Africa a number of stages were involved. The next section highlights these and their

roles and at the same time introduces the key departments concerned with mining, energy and the environment.

5.5 Key development policies post 1994

There were a number of macroeconomic development policies post 1994. Chronologically these moved further and further down the neoliberal road. The earliest and one of the most significant policy frameworks adopted by the ANC government, and at least in part in keeping with its former progressive policies, was the Reconstruction and Development Programme (RDP) in 1994. This was contained in the manifesto of the 1994 election coming out of COSATU and particularly the National Union of Mine Workers (NUM). It aimed at ameliorating the circumstances of the black majority and warned that ‘policies concentrating purely on promoting economic growth would accentuate existing inequalities, [and] perpetuate mass poverty’ (Terreblanche 2002: 108). It sought to address the distortions and injustices that had developed during the apartheid era. A number of the RDP’s progressive social policies were adopted, such as in the areas of free primary health care for children under 6 years and pregnant women, and mine safety legislation. Others, however, such as community participation in environmental policy and decision making processes, were advocated but not implemented. Thus the RDP represented at least some attempt to build a new cohesive nation and overcome the divisions of the past.

However, the RDP lacked detail in its application and was underpinned or, it could be argued, was undermined by conservative economic policies. Following it, in June 1996, and undoing much of its thrust was GEAR (Growth, Employment and Redistribution), a new macroeconomic strategy and the economic plan championed by Thabo Mbeki, Mandela’s successor. Its focus shifted to economic growth. Its general thrust was in accordance with the Washington Consensus,⁴³ and in many ways amounted to a self-imposed set of

⁴³ The Washington Consensus refers to the beginnings of neoliberalism and can be dated to the late 1970s. To what extent it constituted a consensus is questionable as it was one man’s assessment of ‘what would be regarded in Washington as constituting a desirable set of economic policy reforms’

IMF- style structural adjustment policies. It removed many of the social reforms included in the RDP (large scale land reform, housing and municipal services, employment creation and youth programmes). The adoption of GEAR meant the economy was effectively divided in two: the first economy a capitalist enclave for a minority (6 per cent) of the population; the second, the informal sector, for the majority, the unemployed who live in the townships and in rural areas.

In practice GEAR failed all three of its own key performance indicators for success: triggering growth, stimulating job creation and increasing socio-economic equality (Marais 2001: 165). The two economies of the post apartheid years have continued and have in fact further entrenched the systematic and systemic development of undevelopment and poverty. The formal economy, it is important to stress, is intimately dependent on the informal (which provides cheap labour underpinning the formal sector⁴⁴) while those in the informal economy are largely dependent on their own resources for survival. GEAR amounted to no more than a set of fantasy projections. Its failure has sometimes been conceded even by the government itself.

The third institution of significance post-1994 was the broad-based Black Economic Empowerment (BEE) Act of 2003 which was essentially a growth strategy targeting racial inequality. The purpose of the BEE was claimed to be both moral and economic. It set out to redress the wrongs of the apartheid government which had systematically excluded black African, Indian and 'coloured' people from equal participation in the country's economy. It also sought to assist the economy to grow. Particularly relevant to this study is that, as part of the BEE Act, there is a Mining Charter which aims to transform the mining sector so that mining companies have at least 26 per cent BEE (in essence black) ownership. In time this was planned to rise to 51 per cent.

(Williamson 2002). The Washington consensus or neoliberalism constitutes a more extreme form of capitalism which saw the end of Keynesianism (Williamson 2002).

⁴⁴ Such as security and cleaning services, and providing a large pool of unemployed which helps keep wages down.

Walshe (in Gumede 2007: 12) claims BEE was aimed at building a black business class by establishing a national fund accessible to black Africans for business ventures. It was not seen as a redistributive tool but rather as part of a growth strategy. It was believed to be necessary to enable black Africans to 'regulate their own standard of living' and to 'supply the needs of their own people'. The concept had potential as an affirmative action strategy within the neoliberal framework. Marais (2001: 135) however draws attention to the relevant history in the actual implementation and operation of BEE. He points to the 'long standing but growing force of *bourgeois* and *petit bourgeois* layers within the ANC' and to that part of ANC ideology which emerged from the 1960s onward, which favoured the development of a black capitalist class. The notion of BEE had originally come from the National African Federated Chambers of Commerce (Marais 2001: 136), in other words, the capitalist class, in what must be considered a politically astute move to protect the wealth and class *status quo*, even if not the racial *status quo* of the elite. In that form it did not encompass all blacks but the 'enrichment of the minority black capitalist class' (Maseko 1999 quoted in Marais 2001: 136). Significantly too, Gumede (2007: 127) refers to the 'massive potential for corruption when privatisation is used to promote black economic empowerment', particularly when this is closely linked to the political elite. It has been plausibly claimed that '[t]he white establishment use black faces to gain access to the new government and often pay the blacks in the form of shares in their companies.' BEE as it was already understood by late 1996 was a 'sham' (Business Report, 10 October 1997: quoted in Bond 2000: 39).

The fourth major macroeconomic strategy adopted by the South African government post-apartheid was the Accelerated and Shared Growth Initiative of South Africa (or AsgiSA) introduced in 2006 during Mbeki's second term of office. This has resulted in an increasing amount of state investment in economic infrastructure, investment made on the basis of financial returns and economic growth (McDonald 2009) rather than of meeting the needs of an impoverished population. This also marked a move away from the large scale expenditure by the state, as occurred in the GEAR years, for social infrastructure (Gentle 2009). The ANC's partners, the South African

Communist Party and COSATU, supported AsgiSA as part of the post-GEAR consensus for increased government expenditure on the parastatals (Gentle 2009: 67). As McDonald (2009) argues, AsgiSA investment was directed to the needs of capital, being especially channelled to the interests of mining and minerals beneficiation. Both GEAR and AsgiSA represent the tension between service delivery to the people and servicing the needs of capital accumulation, with the latter being triumphant and the principle being exported throughout the rest of Africa under the guise of development (McDonald 2009).

The AsgiSA development model is supported by the African Union's New Economic Partnership for Africa's Development (NEPAD). Amongst its stated objectives are the eradication of poverty, the sustainable growth and development of African countries, the end to the marginalisation of African countries in the globalised world and the full integration of African countries into the global economy (NEPAD 2010). Drafted under President Mbeki's direction, NEPAD is very pro-corporations, calling for a massive amount of foreign investment in privatised infrastructure. Its aims are to open up African markets and to secure increased trade, investment and aid, within the neoliberal development framework. Through NEPAD, the South African state facilitates the expansion and penetration of South African corporate, state and parastatal social relations into African economies (McDonald 2009), allowing the surplus reserves of capital to expand beyond the South African economy. The imperatives are profit, growth and the further expansion of the capitalist system throughout southern Africa. The consequence are the destruction of local economies and cultures, the de-peasantisation and proletarianisation of people, and the seizure of various commons (land, water and minerals in particular). In other words, the particular social relations of production continue to expand and deepen the rift between both classes and between humans and the environment.

Other institutions which impinge on the subject matter of this study are the South African Constitution and various government departments – the Department of Minerals, the Department of Energy and the Department of

Environment⁴⁵. The constitution is widely acknowledged as excellent on a number of counts, including that it is remarkable for its attention to the environment. The South African constitution and the environmental legislation which has flowed from that, are amongst some of the best in the world. Subsequent policies and practices have not been so remarkable.

Under the Minerals Resources Development Act of 2002, the government nationalised mineral resources (Spoor 2009). Previously, land owners owned both the surface and underground mineral rights and therefore could negotiate with mining companies for compensation if land was taken for mining purposes. Now, the Department of Minerals controls mineral resources and issues prospecting and mining permits, subject to environmental impact assessments (EIAs) and in consultation with landowners and the communities affected – the last being points ‘in principle’. The EIAs are funded by the prospective mining company and it is the companies who employ the relevant consultants (Spoor 2009) so that the prospects for such EIAs being unbiased and critical of their contractors are not high. Again, the community consultations are often far removed from best practice, as Grobler (2009), the documentary journalist, indicates.

Mining applications are subject to appraisal by the Department of Minerals and Resources (DMR) which can authorise them even against the advice of other departments, such as the Department of the Environment (DE) (and which the DE cannot contest). According to Grobler (2009), the Minerals Resources Development Act has delivered all sorts of irregularities. She argues that permits for both prospecting and mining are being issued in locations which are very sensitive in terms of both water and biodiversity. Grobler maintains that black rural communities, who are supposed to benefit from the new mining laws, aren’t. This is principally because the BEE partners are not bringing rural communities in as their partners. Instead, Grobler (2009: np) argues, they choose partners who are ‘high ranking government officials, their wives or

⁴⁵ Prior to June 2009, there were the Department of Minerals and Energy (DME) and the Department of Environment and Tourism (DEAT).

husbands or family members'. Groenewald (2009) confirms this claim. She describes how Coal of Africa, an Australian company covered in this study, is partnered with the Mvelaphanda group (holding 26 per cent) which was, until May 2009, headed by 'Tokyo' Sexwale, a very wealthy former cabinet member and who later was appointed as head of the Human Settlements Ministry by President Jacob Zuma.

Grobler (2009) claims that 'the Minister for Education's husband has a mining company; the Minister for Transport's wife has a mining company; the Minister for Water Affairs, who used to be Minister of Minerals and Energy's husband, has a mining company. The Ex-Director-general of Trade and Industry and four of South Africa's provinces' previous premiers own or are BEE partners in mining companies. The list goes on and on' (Grobler 2009: 10). Since the national election held in May 2009, the former Minister for Minerals and Energy, Buyelwa Sonjica has been made Minister for the Environment. This means she will be the minister considering appeals made against the licences issued by the former DME, her former department. Environmentalists saw this as a sign that BEE coal-mining interests would now trump environmental concerns (Grobler 2009).

That such high ranking and powerful public officials benefit from BEE brings into question the integrity not only of the programme but of the overall governance of mining in South Africa. This is a major concern. The fossil fuel sector has a powerful lobbying voice at both the international level and, in the case of South Africa, at the national level where corruption and political influence merge. This is but one vignette in the case for why national and global institutions will not tackle global warming.

Grobler (2010) has also indicated that the state has announced plans to start its own mining company. The government has proposed that anyone who goes into partnership with it will then be exempt from some of the legislative requirements, including requirements in relation to environmental management planning and consultation with landowners. This would amount to not only a

further corporatisation of the state, but a complete merging of the interests of the government and those of the mining sector, including the coal sector.

On the 23 June 2009, The Minister for Mineral Resources Susan Shabangu, in addressing the new Zuma-led parliament, said:

In line with the internationally recognised principle that natural resources are a national patrimony, the heritage of all South Africans, the Minerals and Petroleum Resources Development Act (MPRDA) vested the custodianship of all exploration and mineral rights in the State in 2004. Since the promulgation of the MPRDA, some progress, albeit less than envisaged, has been made toward the attainment of the objectives of the Mining Charter⁴⁶. The promulgation of the MPRDA has also unlocked the mineral development potential of South Africa. Since May 2004 we have received and processed an unparalleled number of applications for prospecting, exploration and mining, collectively peaking above 20,000 and resulting in the development of several new projects. This is completely contrary to what has proven to be inept analysis, which suggested at the time that our new regulatory framework would destroy the mining industry (Shabangu 2009).

She went on to say that:

Mining remains an important contributor to the country's economic growth, with an average of 50 per cent of the country's export earnings being derived from mining, while the sector is also a leading contributor to the country's coffers through taxation. This emphasises the sensitivity with which we must treat the industry (Shabangu 2009).

Shabangu also spoke about actions the department would be taking in response to the 2008-2009 global financial crisis and which resulted in the departmental-

⁴⁶ The Mining Charter was developed by the ANC government in 2004 as a benchmark for reform of the mining sector – covering issues such as racial equity in mining, increased black economic control and labour conditions.

led Mining Industry Growth, Development and Employment Task Team (MIGDETT) developing recommendations that would ensure optimal development of the mining industry (Shabangu 2010). What actions, laws and policies this translates into are predictable, given the carte blanche treatment of the national and international mining sector under ANC governments to date.

A further development of the economy, that is significant in terms of the organisation of the social relations of production, is closely entwined with the MEC and which is of continuing and growing significance, is the growth in the financial sector. As Ashman *et al.* (2010: np) write:

In the context of South African production, financialisation has produced a particular combination of short-term capital inflows (accompanied by rising consumer debt largely spent on luxury items) and a massive long-term outflow of capital as major 'domestic' corporations have chosen offshore listing and to internationalise their operations while concentrating within South Africa on core profitable MEC sectors. The result, even before the impact of the global financial crisis, was a jobless form of growth and the persistence of mass poverty for the majority alongside rising living standards for a small minority, including new black elites.

Furthermore, what was needed in South Africa was for profits earned to be reinvested within the country in long-term value-added sectors that increased employment with decent working conditions (Mohamed 2009). In other words, the economy needed to be restructured towards more labour intensive industries and away from the MEC and the financial sectors, the latter of which contributed significantly to the destabilisation of the South African economy; from the high unemployment, underemployment and casualisation of employment; and from bubbles in real estate and financial asset markets (Mohamed 2009). Mohamed (2009) confirms that various government policies have led to increased financialisation of South Africa's largest corporations. Short-term and speculative investments have ensued. The highly concentrated

South African economy is now even more concentrated and dependent on the MEC, particularly for export earnings.

5.6 Discussion and conclusion

What is significant and central to this study is that these macroeconomic policies of the ANC government have ensured South Africa has the highest national and one of the highest per capita carbon emission levels in the world. The arguments used by the government that economic growth is necessary to lift the poor out of poverty and hence, that no caps should be placed on South Africa's carbon emissions, are false.

South Africa illustrates the deepening and expanding division and the intimately connected paradox of private accumulation and public impoverishment within the system of capitalism. It represents a microcosm of the global capitalist political economy in which the accumulation of capital is juxtaposed to the increasing fragility of life for the majority of humans and species, the growing alienation of humans from the environment and through the destruction of the biosphere. For the ANC to gain power, compromise was perhaps inevitable, but the adoption of a neoliberal agenda at the expense of the poor and black communities which had brought them to power is a deep betrayal and abrogation of responsibility to the ANC's constituents – the black majority. The socio-economic structures that the ANC inherited, along with South Africa's continued integration into the global economy as a semi-peripheral nation, have been further cemented since 1994, with the continuing dominance of the MEC in concert with the financial sector, in the South African economy and the rise of South Africa's wealthy black elite, in part through the policies of Black Economic Empowerment.

The extreme economic disparity experienced by much of the black population is a very clear retreat from commitments to public ownership enshrined in the Freedom Charter which was a statement of the core principles adopted in 1955 by the South African Congress Alliance, embodying the hopes and aspirations of the black majority. Further the unambiguous safeguarding of private capital,

the obstacles placed in the way of progressive economic policies by business interests and the entrenched apartheid-era bureaucracy are all part of the neoliberal package which contributes to a critical understanding of South African society and the dominant political economy of today.

South Africa has experienced colonialism, civil (colonial) war and apartheid. Each of these has incontestably and significantly influenced the shaping of the country. It is contemporary global political economy structures and ideology however which have been most determinative of current economic policies. One of South Africa's foremost social and political commentators and activist academics, Ashwin Desai (2002: 18) writes '[t]he transition to democracy was underpinned by corporatism ... conflict was to be institutionalized [and] control [was to be] by the ANC or its allies in the tripartite alliance'⁴⁷. He observes that today dissent from the ANC party line is increasingly not tolerated.

While the motivations are contested (Bond 2006; Magubane 2004), it is clear that the ANC diverted from the revolutionary course that governed them as a national liberation movement to a country integrated into the global capitalist economy with neoliberal policies. The ANC, in confronting the moral dilemma faced by a party whose constituents have remained impoverished, marginalised and trapped in the townships, has continued to leverage support from the people because of its historical role in freeing South Africa from apartheid. Disillusionment, violence and xenophobia are growing and the pressures brought about by global warming and a predictable massive influx of refugees from other African countries will serve to create in South Africa a tinder box for widespread racial, class and violent action and, one can envisage, potentially, a failed state, like its neighbour, Zimbabwe.

Connell (2009: np) maintains that real power in South Africa remains 'at the commanding heights of the black political and economic elite and with the rich white farmers'. Fine (2008) writes: 'it was inescapable that there was an

⁴⁷ The Tripartite Alliance includes the ANC, Congress of South African Trade Unions (COSATU) and the South African Communist Party (SACP).

integral partnership between state and private capital, and an equally integral connection between a core set of activities around mining and energy, straddling the public/private divide'. This partnership with state capital supporting/subsidising private capital can be seen very explicitly in the energy sector today. The media have revealed that some of the largest mining companies in South Africa continue to have subsidised electricity from Eskom in special, secret 'sweet-heart' deals⁴⁸, while the people of South Africa, many of whom cannot afford electricity at all, are faced with large price hikes. In the context of global warming, it is then wholly appropriate that the thesis focuses on the power of this sector. It is the David and Goliath of South Africa and Africa – the impoverished, disempowered people who live on the margins in the struggle for survival versus corporate capital, corporatised state interests and an economy structured to favour the latter. It is a complex struggle for survival that now has added to it the growing impacts from global warming – food shortages, water shortages and a growing influx of refugees - and the disequilibrium of the very biosphere upon which the people so closely depend.

Chapters 6 and 7 will provide post-apartheid examples of the power and centrality of the coal and electricity sectors to the South African economy at an empirical level. They conclude with an analysis of the impact of this sector on South Africa in a global warming world.

Moving this discussion to the international arena, in terms of the ANC development trajectory and the neoliberal thrust of economic policies adopted in the post-apartheid era, it is significant that the ANC came to power during the height of the neoliberal globalisation project. For some, the economic policies of post-apartheid South Africa have been little more than a continuation of the apartheid era economics and the question that is raised frequently in the literature (Bond 2000, 2006; Magubane 2004; Marais 2001; Terreblanche 2002) is whether the ANC government deliberately betrayed its constituents, or whether it was powerless to choose differently. Saul (2001), in

⁴⁸ BHP Billiton smelters import bauxite aluminium ore from Australia, use subsidised Eskom electricity in arc furnaces to produce the metal which is then exported back to Australia (*Daily News* 2010).

an article titled '*Cry for the Beloved Country: Post-Apartheid Denouement*', maintains that there was a betrayal on the part of the ANC itself, while Connell (2009) suggests the ANC government was and remains powerless to be other than part of the globalisation project of capitalism.

There was a concurrence of events at the time of the achievement of political democracy: the end of the apartheid era; the full re-integration of South Africa into the international arena after the years of sanctions and boycotts; the dismantling of protective tariffs by the new South African ANC government; the demise of the Soviet Union; and the hey-day of neoliberal ideological hegemony. The ideological climate of the global economy was dominated by the belief that there was no alternative to the neoliberal way.

The implications of the neoliberal model of development now adopted by the South African political elite are rippling - perhaps raging - throughout sub-Saharan Africa. The privatisation of African economies is now led by significant pan-African institutions. In this, South Africa takes a lead role, such as in the African Union's New Partnership for Africa's Development (NEPAD) whose neoliberal mandate is to build public/private partnerships to promote growth, investment and jobs. In conjunction with the political institutions, and true to the capitalist globalisation project, South African companies are joining the rush to exploit other African countries (Bond 2006; Magubane 2004; and McDonald 2009). The global context for the internal South African economic structure is its location in the global economy as a semi-peripheral economy led by a political elite convinced that the neoliberal nature of contemporary globalisation leaves Pretoria with no other choice than to support the Washington Consensus (Connell 2009). Just as South Africa belongs to the ANC in the sense that its moral authority (and ideological power) stem from its role in South Africa's liberation history, South Africa, through its relations with international neoliberal institutions such as the World Bank, is able to spread its economic, financial and corporate interests throughout countries in sub-Saharan Africa.

All of this presents highly relevant background to the question of global warming. This chapter has provided empirical evidence of the growing rift in society between the powerful elite, the owners and controllers of capital on the one hand, and society and the environment on the other. It has shown in whose interests the economy is structured in South Africa. In the context of this thesis, the study of South Africa, as I indicated in Chapter 4 in the quote from Amin as ‘a microcosm of the world capitalist system’, represents an analysis of the convergence of powerful political and economic interests and structures which deepen the rift between humans and the environment and between humans and fellow humans. This is the very rift that is fundamental to the capitalist social relations of production and is the genesis of a multitude of environmental and social crises, including the crisis of global warming. At the same time, it is an example of the unfolding tragedy of global warming, which will first and foremost affect those with the least power to change the course of events, and those with the least adaptive capacity to be able to withstand future global warming consequences.

What must not be lost sight of in this description and analysis of South Africa in the post-apartheid era is the lost opportunity to build a united society, a real sense of community across the country. It would have been difficult but the time was ripe in 1994 and the period immediately following. The country was ready for that; in retrospect it was calling out for it. Mandela to some limited extent provided it but never really ‘seized the day’. And certainly once Mbeki was in power, with his desire to build a neoliberal state, that opportunity was gone. The white elite, realising that to preserve their own individual power there was no other way, welcomed the black elite to join their power base and that black elite quickly learned the ways of selfish individualism and increasingly severed their links with their black constituents. The moment was missed and the neoliberal die was cast.

The next two chapters look more specifically at the economy today and its links, first to the electricity sector and then to the coal sector. These show how the economic structure and ideological power and control of these sectors further cement the South African economy within the capitalist globalisation

project while, at the same time, precluding any hope for an ecologically sustainable future and in turn for addressing in any coherent or effective way global warming. In addition they explain the workings of the South African economy, especially the energy sector but importantly also contribute to the empirical basis which leads to the theoretical framework for the thesis. They thus provide the springboard for the theoretical section of the thesis in Part III.

CHAPTER 6 The South African economy and the electricity sector

6.1 Introduction

This part of the thesis links the realities of the South African experience to what is a contradictory model of development. The two sub-sets of the MEC, first in this chapter the electricity sector and then, in the next, the coal sector are examined through the prism of global warming. These sectors are integral to and determinative components of the social relations of production, the central core of the capital accumulation process in South Africa and the deepening contradiction between capital accumulation and the biosphere which is the structural underpinning of global warming. In the next chapter, the practical significance of coal to capital accumulation within South Africa and the expansion of the South African economy and capitalism in Africa are outlined. South Africa provides an example of an African country at grave risk from the consequences of global warming which, nevertheless, remains unwavering in its pursuit of coal fired electricity to underpin its economic growth. This also provides an empirical guide to the focus of the theoretical framework in Part III.

South Africa has been described as ‘the economic powerhouse of Africa’ (South Africa Info 2010), leading in industrial and mineral production and generating a large proportion of Africa's electricity. It is both an important emerging economy and also the gateway to other African markets (South Africa Info 2010). It has well-developed financial, legal, communications, energy and transport sectors, highly ranked banking regulations and stock exchange, and sound infrastructure supporting the distribution of goods throughout the southern African region. In other words, the infrastructure required by the global corporate sector is first world class.

The chapter builds on the description and analysis of Africa, South Africa and recent South African economic history as set out in Chapters 4 and 5. Beyond this introduction, it identifies the electricity institutions and the various sources

of electricity and electricity governance, before turning to South Africa's position on global warming. It finishes by setting the electricity sector in the context of the broad economy thereby providing a base to lead into a detailed discussion of the coal industry, the predominant source of electricity, in the next chapter.

6.2 The South African electricity environment

A major concern in considering the key institutions in South Africa in relation to electricity and global warming is the disconnect between the rhetoric of policy statements and the reality of economic development. On the one hand is the acknowledgement of poverty, inequality and the pending crisis of global warming; on the other is the reality of the policies implemented with the clear intent of growing the economy, increasing the coal-based electricity supply and expanding the capitalist relations of production throughout southern Africa. This disconnect can also be found in the arguments used by the South African government in climate change negotiations, where it has proposed unrestrained growth to enable the country to lift the poor out of poverty. The reality is that the neoliberal development agenda has resulted in a widening gap between rich and poor.

Understanding the current situation on energy policy in South Africa and the links between the electricity sector and the economy in general can better be achieved if the reader has some knowledge of the various institutions that exist in South Africa which govern and influence energy policy. This section therefore briefly outlines the energy institutions – NERSA (the National Energy Regulator of South Africa), Eskom, SASOL and others.

6.2.1 NERSA

The National Energy Regulator (NERSA) is the authority established in 1995 to regulate electricity, piped-gas and petroleum pipeline industries. Anecdotally, NERSA is known as a 'toothless tiger'. It formed the Electricity Working Group in 1995 to develop proposals to restructure the distribution industry, a process in which different sectors of society were to be involved. It

became the case, however, that civil society and the trade unions were increasingly marginalised (McDonald 2009: 75). This resulted in ‘separating, ringfencing and corporatizing the generation, transmission and distribution sectors’ (McDonald 2009: 76) of Eskom (see below). This arrangement was then accepted in 2001 by the government which passed an Act which enabled the transformation of Eskom to a business model to assist its entry into global markets (McDonald 2009: 76). NERSA’s role was restricted to regulating Eskom’s market access and approving electricity tariffs, thereby reflecting the neoliberal development model adopted by South Africa.

6.2.2 *Eskom*

A remarkable 95 per cent of South Africa’s electricity and a yet more remarkable 45 per cent of Africa’s is generated and transmitted by the state owned parastatal enterprise known as Eskom (Eskom 2008) which, as indicated above, is regulated by NERSA. Eskom and its owners, the South African Government, are committed to continued growth of the South African energy sector, using coal as the predominant fuel source, an ‘energy future on a coal and nuclear strategy with limited renewable energy targets ... [the last amounting] to 1.5 per cent of final consumption’ (Sacsis 2009: np).

Eskom was established in 1923. It is run on business principles with a mandate to deliver cheap and abundant electricity, primarily to mining and industry. It is thus a key institution in the MEC (Eskom 2010). It employs about 35,500 employees, reduced from 66,000 over the past two decades (World Bank 2009). Eskom generates, transmits and distributes electricity to industrial, mining, commercial, agricultural and residential customers and redistributors. It is described by McDonald (2009) as an institutional giant on the African continent and has continent-wide activities, buying and selling electricity to the countries of the Southern African Development Community (SADC).⁴⁹

⁴⁹ Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa Swaziland, Tanzania, Zambia, Zimbabwe

Both the expansion and partial privatisation of Eskom paralleled South Africa's process of post-apartheid economic neoliberalisation, with Eskom becoming a site for capital accumulation and sub-imperial expansion in the SADC. A wholly owned subsidiary of Eskom Holdings, The Eskom Enterprises (Pty) Limited group, was created in 1999 as part of a deregulatory thrust in South Africa around the energy sector, with expansion into telecommunications, IT, engineering and other services (Greenberg 2009: 91). A major focus of Eskom Enterprises has been to provide 'lifecycle support and plant maintenance, network protection and support for the build [expansion] programme for all Eskom divisions' (Eskom 2010: np). Of growing significance is the thrust to play a lead role in the South African export and expansion programme in Africa generally, on the basis of the GEAR macroeconomic strategy and the New Partnership for Africa's Development (NEPAD) (Greenberg 2009).

Through Eskom's sub-imperial dominance of the regional market, it is expected for example that South Africa will use 60 per cent of the Democratic Republic of Congo's (DRC) output from the Inga Dams on the Congo River. In 2006, more than 80 per cent of Eskom's imported electricity came from Mozambique's Cahora Bassa Hydro-electric scheme (which for many years has been bought at below cost under apartheid-era agreements), with a significant percentage of this being on-sold to Zimbabwe (for a profit). Such activities are driven by a desire for capital accumulation rather than for development to benefit the poor. Indeed they have often led to dispossession of local communities of community-owned land and free access to water.

Within South Africa, Eskom has 13 coal fired power stations, centralised into an interlocked power grid, with two more, Medupi near Lephalale in the Limpopo Province, already under construction, and Kusile, which has contracts already signed for construction, in Mpumalanga Province. Upon completion, Medupi and Lephalale will be the world's third and fourth largest coal-fired power plants respectively (Munnik and Hallows 2009). They have resulted in a flurry of new coal mining activity, licence applications, approvals and

contracts to supply coal. They are just two of the five large-scale plants that Eskom is proposing to build.

The decision to build Medupi and Kusile was supported by claims that clean coal technologies – carbon capture and storage (CCS) - will be used (the major problems of which were discussed in Chapter 3). These claims are additionally challenged by the fact that South Africa does not have the right geological conditions for such technologies (Munnik and Hallowes 2009). It is to be noted too that the government's rush to support coal is bolstered by having designated Eskom as the single buyer of power produced by independent producers. This reinforces yet further the preferential position of coal over renewables.

Eskom's current power capacity is 40,000 Mega Watts (MW), with 94 per cent of base load from coal, the majority of the rest from the 1800 MW Koeberg nuclear power plant, and a small amount from hydroelectric plants (Hallowes and Munnik 2009: 11). According to Eskom's acting chairman, Mpho Makwana (2010), its current building plan will bring another 12,300 MW on line by 2017. Makwana is reported as having claimed that another 50,000 MW is required by 2028 – the 'equivalent of another [existing] Eskom and more'. Such projections of future demand have been criticised as being exaggerated and an attempt to justify yet more investment in Eskom infrastructure (Nakhouda 2010: np).

Central to Eskom's growth in South Africa is its reliance on coal which in turn makes it especially central to my study. (I return to this issue in Chapter 7.) Eskom predicts its electricity supply will grow at 4.4 per cent per annum and that CO₂ emissions from electricity generation will double in less than 20 years. However, in its 2008 Annual Report, Eskom states:

[Eskom's] climate change strategy contains our commitment to reduce our greenhouse gas emissions [and the] capital expansion plan provides a significant opportunity to change our energy mix by increasing the nuclear, gas, renewables and clean coal components. Plans include

increasing the renewables component to at least 1 600 MW by 2025 (Eskom 2008).

Eskom (2008) claims that clean coal technologies are already being applied to the coal-fired power stations under construction. This is at best misleading, given that such technologies will not be available for commercial use before 2040 (ABC Four Corners 2009), and then only for appropriate geological formations not present in South Africa (Hallowes and Munnik 2009). Also the cost of retrofitting coal fired power stations would be prohibitive.

6.2.3 *Sasol*

Sasol (Afrikaans for South African Coal and Oil) is a coal-to-liquids (CTL) producer, established under the apartheid regime as a means of securing South Africa's independence from foreign oil imports. It has more recently expanded its interests into mining, energy, chemicals and synthetic fuels. It was at one time the largest private company listed on the Johannesburg Stock Exchange and is currently the largest coal-to-liquids chemicals producer in the world. Sasol's Secunda CTL plant in the Mpumalanga region is the biggest single emitter of carbon dioxide on the planet, producing, for example, 318 million tons of CO₂ in 2003 (Science in Africa 2006). Sasol has plans to construct a new CTL plant in the Limpopo Region. It is now also a global petrochemical group, producing fuels and chemicals. It is important at two levels: first as a component of South Africa's high carbon emission energy mix; and second as a political player. Its economic role also both furthers and is driven by neoliberalism. For example Earthlife Africa and Oxfam International (2009) has revealed attempts by Sasol to claim carbon credits inappropriately under the Clean Development Mechanism (CDM) projects by building a gas pipeline from Mozambique to Gauteng to fuel its Secunda plant. Such attempts are more in line with capital accumulation ambitions than with reducing carbon emissions and forestalling the likelihood of irreversible climate change.

6.2.4 Other

Mention of South Africa's nuclear power and renewables completes the picture. South Africa has the only nuclear power station in Africa. It supplies 6 per cent of South Africa's electricity and has a life expectancy of 30-40 years (Eskom 2010). Groenewald writing for *The Mail and Guardian* (5 March 2010), reported that the South African government was putting out a tender for a second nuclear power station in September 2010, after the publication in May/June of the government's second integrated resource plan (IRP2) which was to outline South Africa's future energy strategy. The IRP2 would reveal how many nuclear power stations the country would ultimately build. As at 31 January 2011, the IRP2 has still not been released. According to Groenewald (2010: np), South Africa's long-term mitigation strategy and how the country will cap its carbon emissions between 2025 and 2050 'foresees a huge role for nuclear power and renewable resources and this will almost certainly be reflected in the IRP2'. The existing (Koeberg) nuclear power plant has a total capacity of 1,800 MW but according to Groenewald (2010), Eskom plans to 'manage' South Africa's carbon footprint by generating 20,000 MW from nuclear reactors by 2025. She writes that the deal for a second nuclear power plant was worth US\$12 billion in 2008 and that even if South Africa were to award the tender for a nuclear reactor by the end of 2010 (it did not), the new nuclear power station would come online only in 2019 at the earliest. She seriously questions how South Africa will be able to meet its voluntary carbon emission reduction targets of 34 per cent below 'business as usual' levels by 2020 and by 42 per cent by 2025, if nuclear does not come to the party. The long-term mitigation strategy (2008) called for a second nuclear reactor, but the tender process was cancelled at the end of 2008 at the time of political uncertainties around the demise of Thabo Mbeki. Nuclear power, however, still remains on the energy expansion agenda (Groenewald 2010).

Bids to build a second nuclear plant have been costed at 'substantially more than the R100 to R120 billion [A\$16.6 to A\$20 billion] that Eskom had estimated' (Hallowes 2009: 11).

Munnik and Hallowes (2009: np) write:

The nuclear component of future electricity supply is 27 per cent in one scenario, and 0 per cent in another. Nuclear energy poses health and safety risks, and its claims to carbon-neutrality are questionable. The fuel enrichment is, for example, very energy intensive. But the immediate concern should focus on nuclear energy's economic implications. Nuclear energy is unpredictably expensive, as the PBMR's rising costs (now at R16 billion [\$A2.35 billion]) have shown. The cost of the Finnish nuclear reactors being built by Areva, the French company favoured to lead South Africa's nuclear expansion, has already more than doubled from the 2.5 billion Euro declared in the Finnish parliament in 2003. On this scale, South African nuclear ambitions will cost more than the arms deal.'⁵⁰

Significantly Munnik and Hallows (2009: np) add: 'It will become the tail that wags the dog of macro-economic policy.'

According to the *Mail and Guardian* (2010), South Africa again decided to shelve the development of a proposed second nuclear power plant, a Pebble Bed Modular Reactor (PBMR), due to the failure to find private investors and customers outside of South Africa for the energy produced. This is despite the fact that to date R9.2 billion had been spent on the PBMR, 80 per cent of the money coming from the government.⁵¹

Finally, South Africa, a land of long, hot and sunny summers, good potential wind and wave power, has a very small component of renewable energy - 283 MW out of a total of nearly 40,000 MW (Banks and Schaffler 2006)), with plans for only a small increase in the future. According to Groenewald (2010), and as indicated above, Eskom's six-point plan to curb climate change includes 1,600MW of electricity to be supplied by renewables by 2025. Factors

⁵⁰ PBMR refers to Pebble Bed Modular Reactor. The arms deal, announced in 1998, was to re-equip the South African military forces, the first phase involving both the purchase of various hardware including patrol corvettes, light helicopters and submarines from manufacturers in Europe and kickbacks to high ranking members of the ANC. The first phase of the deal alone was in the order of R43bn (US\$5.5bn) and more followed.

⁵¹ *Mail and Guardian* 2010 SA mothballs Pebble Bed Modular Reactor project September 17 2010. <http://mg.co.za/article/2010-09-17-sa-mothballs-pebble-bed-modular-reactor-project>. Accessed March 2011.

affecting the uptake of renewable energy include the lack of political will and also, for Eskom, the fact that having a centralised grid based on coal fired power is the most profitable option.

6.3 The South African economy, electricity and global warming

In the global drive for mineral resources and energy supplies, the African continent has become of major strategic importance (Buscher 2009), both as a source of fossil fuels and energy in the global economy and also as a site of capital accumulation. As the regional and expanding hegemonic power and dominant country in the electricity sector on the continent (McDonald 2009), South Africa can be expected to have an increasingly influential role in Africa *vis-à-vis* the international arena, including around energy, global warming and the spread of capitalism. It is thus important to acknowledge the intricate relationship between electricity developments on the African continent and South Africa's energy sector developments. McDonald (2009: xv) maintains that 'electricity has become an integral part of all capitalist activity'.

In the context of this thesis it is essential to examine how electricity fits into the wider dynamics of capital accumulation and crisis in Africa. This is particularly so at a time when the rush to build electricity capacity on the continent is akin to the 19th century 'scramble for Africa' with 'electricity grid lines replacing the colonial railway lines of yesteryear' (McDonald 2009: xvi). South African, American, European and Asian firms are increasingly active in Africa. The neoliberal development model, which drives and legitimises this expansion of capitalism, also serves both to justify neoliberal ideology as the only relevant governance model and to defend the spread of capitalist processes 'in all spheres of life' (Buscher 2009: 3956). The hegemonic ideology in this context becomes a practical reality.

The benefits of the energy sector are not evenly distributed but favour the mining and financial sectors and, domestically, the well-off. The expansion of electricity by South Africa as a sub-imperial power, both for home consumption and for other sub-Saharan countries, is also accompanied by

increased social repression and forced relocation for hundreds of thousands of people who get in the way of this development. McDonald (2009: xviii) argues that in South Africa to date ‘the mining and industry sectors remain the primary beneficiaries of state electricity expenditures, but these sectors are joined now by a growing (urban) financial and services sector that has begun to dominate the South African economy’.

Today, more than 30 per cent of South Africans are dependent on paraffin, raw coal and open wood fires for their cooking, heating and lighting needs (McDonald 2009). Renewable energy sources have barely been explored. As previously stated, imported hydropower, for example, from Mozambique, and the DRC has had detrimental social and ecological impacts on the people of these countries as a result of large scale dam building. Again, these developments are driven by a desire for capital accumulation rather than meeting the needs of the people.

Despite the fact that most black South Africans have always had no, inadequate, or at best intermittent, illegal and/or unreliable electricity supplies (McDonald 2009), an electricity crisis in South Africa was first formally acknowledged only in 2005 when industry and the urban (mostly white) middle class faced blackouts known as ‘load-shedding’⁵². That this ‘load-shedding’ constituted a crisis is something of a metaphor for inequality in South Africa. It is also an example of uneven development within a country under a capitalist economy. The political economy structure around energy serves to deepen the racial and class divides.

Since the 1990s, South Africa has had one of the most carbon intensive economies in the world (McDonald 2009: 131) and its total carbon emissions are set to grow. Of course, South Africa is only one of many nations with an economy at odds with an ecologically sustainable future, but the decisions

⁵² Load-shedding is the South African term which refers to a rolling black out to save electricity consumption.

being made in South Africa today have the potential to lock not only South Africa further into fossil fuel dependence, but also its neighbours.

Bond (2003: 24) writes '[a]ccess to water and electricity has become a key struggle in South Africa's townships. Thirty per cent of South Africans do not have access to electricity, and yet South Africa ranks as the eleventh largest emitter of carbon dioxide emissions in the world and has one of the highest levels of carbon dioxide emissions per capita in the world'. McDonald (2009) draws up a theoretical framework for analyzing the dominance of coal to South Africa's energy. In doing so he argues that the expansion of South African control over the electricity sector throughout southern Africa carries with it the expansion of neoliberal capitalism's ideological, structural and managerial frameworks.

Defining South Africa's unsustainable, inequitable development, as being created by individuals in power, and whether they yielded to endemic corruption, is not the problem. It is the system. As Bond (2002: xvi) claims, it is 'global capitalism, augmented by patriarchy, racism/ethnicism and various other 'isms' with at the helm, functionaries who promote neo-liberal principles, projects and policies'. South Africa's post-apartheid politicians, bureaucracy and private sector mandarins have recognised that they can make statements about sustainable developments and reducing global warming and at the same time continue to implement policies that take the country in the opposite direction. Bond (2002: 4-5) writes of the 'contradictions associated with over-consumptive eco-destruction and the trajectory of unsustainable non-development' (Bond 2002: 4-5). I agree and will return to these issues in Part III in the theoretical chapters. I have seen with my own eyes the contradictions and different experiences between environment and development by the elites and the majority⁵³. It is these different experiences, the deep class divisions, the exploitation and alienation of the majority of South Africans and their

⁵³ I have had some difficulty in finding an all embracing term that covers the broad collection of people who are not part of the global power and economic elite – peasants, workers, small scale farmers, unemployed urban slum dwellers, unemployed refugees, the lower middle and working classes in developed economies who are beneficiaries of the global capitalist system but whose position is nevertheless fragile within that system.

dispossession and alienation from the land in an economy driven by the imperatives of capital accumulation which leads to the framework in Part III.

6.4 Conclusion

Just as a thread running through the whole thesis is the issue of how best to promote human development in the context of a finite planet and particularly global warming, this study of South Africa too reflects a microcosm of that question: can capitalism, and currently, neoliberal capitalism, provide a material, social and political good that is sustainable and which benefits all South Africans? What or whose interests are being served by the expansion of the fossil-fuelled capitalist system, given the dire consequences already experienced on the African continent as a result of global warming?

In summary, several key points are made in this chapter.

- First, through the expansion of South Africa's electricity system, both in South Africa and throughout sub-Saharan Africa, a significant component of the infrastructure for neoliberal capitalist expansion is being consolidated, carrying with it the structural changes necessary for economic growth and capital accumulation.
- Second, this process can be seen as not only one of accumulation, dispossession and ecological destruction within South Africa but also the story of a sub-imperial power being visited on its sub-Saharan neighbours.
- Third, and critically, it is also the expansion and deepening of the rift between humans and the environment, which if not repaired, could lead to the destruction of human society and the end of an epoch.

This is the ultimate contradiction. There are South Africa's fossil fuelled, capitalist economy on the one hand; and on the other, the very detrimental consequences of this economy to the ecology and South Africa's future

survivability. This chapter has begun to spell out this contradiction. Within that broader story, the coal and electricity sectors directly impinge on not just the environmental issue of global warming but also a whole gamut of environmental, governance and social issues: food and water security, health, air pollution and socio-economic issues of electricity access, poverty and inequality. The power of the energy sectors and their entwinement with the state represent a threat to the fragile democracy that is South Africa today. As Fig (2007) argues, that power is significant in driving macroeconomic policy on the continent. It is a major influence on global warming and on the prospects for South Africa getting to grips (or failing to get to grips) with global warming.

In the next chapter, I will look at the intersection of this power with that of global institutions such as the World Bank - an institution at the heart of neoliberal development and expansion in Africa – in the context of South African coal.

CHAPTER 7 South Africa and coal

7.1 Introduction

This chapter looks more specifically at the coal industry in South Africa and the contradictions this industry encompasses: such as between capitalist industrial development and deepening poverty; and between a global institution's (the World Bank's) purported aims of alleviating poverty, climate change and corruption and its real world support for coal based energy, community impoverishment and corruption. This chapter highlights the size and power of the mining sector and particularly coal mining to the South African economy and how it is integral to the imperatives of capital accumulation. It looks at some of the implications of the coal sector, both nationally for South Africa, but also more locally, in the Limpopo Province. This process is begun in Section 7.2 which looks at the costs and benefits of coal. Thereafter, I will provide two case examples identifying these issues. The first example (section 7.3) examines the granting of a World Bank loan for the expansion of coal power by Eskom. Given the role of coal in global warming and the World Bank's claim to have a major role in addressing global warming, this section of the chapter seeks to make sense of the granting of this loan. It is only able to do so in the context of the neoliberal world that the World Bank fosters. The impact of the hegemony of neoliberalism expressed through the actions of this major global institution on both the political and economic direction of South Africa is exemplified through this loan. Short of any major structural reforms, the worries for the prospects of change to combat global warming in this now global neoliberal political economy are manifest and identified in the conclusion in section 7.5.

The second case example (in Section 7.4) is a direct outcome of the type of developments supported by international institutions such as the World Bank and revolves around Coal of Africa (most commonly called CoAL), an Australian-owned company, expanding its mining activities to an environmentally, historically and culturally highly sensitive region of South Africa. This example shows the political machinations involved in such a

development which in itself bodes ill for global warming. It also bodes ill for any prospect of controlling this industry in a neoliberal environment. The lack of concern on the part of the company for environmental and cultural issues is matched only by its ignoring of the local population's concerns and its failure to recognise the impact its activities will have on poverty and inequality, the local environment generally and global warming particularly.

7.2 The benefits and costs of coal

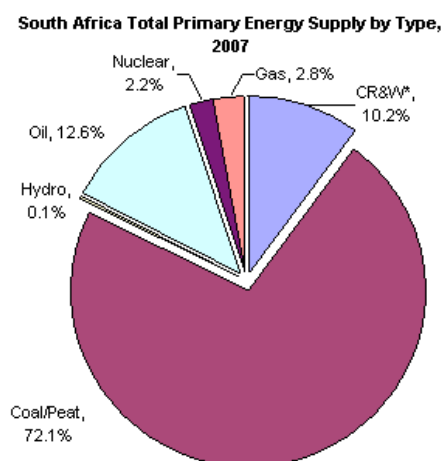
As indicated in Chapter 6, the energy sector is critical to South Africa's economy which is structured around large scale, energy intensive industry and mining. The industrial and mining sectors consume 62.7 per cent of total electricity output (Hallowes and Munnik 2007). It is the second most energy intensive economy in the world and the biggest greenhouse gas emitter on the African continent, with 73 per cent of African emissions (Hallowes and Munnik 2007) but with less than 5 per cent of the African population.

Statistics South Africa 2009 (2009) reveals that mining is of major importance to the economy with, in 2006, the gold mining industry contributing 1.7 per cent to gross domestic product (GDP), the platinum mining industry 2.1 per cent and the coal mining industry 1.4 per cent. The mining sector as a whole is responsible for a large number of formal jobs (as at March 2008 506,000 people or 6.0 per cent of the total labour force). Coal provides the predominant source of energy and South Africa has an abundant supply.

More than 70 per cent of South Africa's primary energy and 90 per cent of electricity generation comes from coal, as does a quarter of its liquid fuels. The country is by far the largest coal producer in Africa and the world's fifth largest (Hallowes and Munnik 2007). It produces about 224 million tonnes of coal each year valued around R60 billion (or \$A10 billion) (MBendi Information Services 2010). About 51 per cent of South African coal mining is carried out underground, with the balance produced by open cast methods. Coal is also a significant earner of foreign exchange. South Africa is the third largest coal

exporting country in the world. The industry is highly concentrated, with a handful of companies producing about 80 per cent of the saleable coal production. More than 58,000 workers are employed in the industry (MBendi Information Services 2010).

Figure 7.1 South Africa's Energy Supply



Source: International Energy Agency (IEA Energy Statistics)
*Combustible renewables and waste

Source: http://www.eia.doe.gov/cabs/South_Africa/Background.html (accessed April 2010).

The South African government's current energy policy reflects a continuing and growing commitment to coal mining and coal power. As indicated in Chapter 6, rapid growth of the economy in recent years has resulted in the government now aiming to double its electricity generation capacity from coal fired power stations by 2025 (EIA 2010)⁵⁴. Whilst one of the supporting arguments for expanding coal mining and the building of new coal fired power stations is that it contributes to employment, the reality is that the industry is being increasingly mechanised and computerised. Profits and output grow but mining employment is decreasing. The total number of jobs in the coal sector has declined by nearly 50 per cent over the last twenty years (Minerals Economics Directorate 2008).

⁵⁴ The Eskom expansion programme will require an additional 50 million tonnes of coal (Eskom 2010; EIA 2010).

Mining is also a sector which has depended on transient labour, transient in the sense that labour travels from one region of the country to another for work within South Africa but transient also in that it has relied heavily on migrant labour. This labour is yet cheaper than the already cheap labour of South Africans. Such migrant labour (mainly from Lesotho, Mozambique, Botswana and Zimbabwe) still plays an integral role in the South African mining industry (MBendi Information Services 2010).

South African government ministers and mining companies argue that mining is essential for the development of South Africa, for the eradication of poverty, the reduction of unemployment, and to provide services such as electricity, water, education and health to South Africans. Yet there is little evidence that coal mining (and other forms of mining) is helping to alleviate poverty and providing community services, and much evidence to the contrary.

The benefits of the mining industry in South Africa are skewed to the better-off. This skewing is however exacerbated by what are effectively state subsidies to mining companies for water, roads, electricity and land. It is then the population in general who bears a considerable burden of the mining industry's activities. Additionally, there is the burden carried by the state, and hence tax payers, of workers' compensation for mining injuries since mining companies do not pay royalties to the state (Spoor 2009).

The costs, in the broader sense, of coal mining are many although often not well researched. For example, little research has been done on mining diseases. An important exception is the work of Roberts (2009: 109) who shows that '26.3 per cent of former miners had been diagnosed and treated for TB while in mine service'. Again (Roberts 2009: 151):

Extremely high levels of respiratory illness were found amongst the former miners. Although just over 31.2 per cent reported that they did not have lung disease on their own assessment, when clinical signs and symptoms were recorded 95.6 per cent were coughing, 71.2 per cent

experienced dyspnoea⁵⁵, 82.4 per cent fever, 80.9 per cent pain and 83.4 per cent had experienced weight loss. It would not be inaccurate to describe the majority of these former miners as “pulmonary cripples”.

What is important beyond these statistics is, as Roberts (2009: 151) argues, that her findings ‘are a shocking indictment of the failure on the part of mining companies to provide information to their employees on the ODMWA [Occupational Diseases in Mines and Works Act 78 of 1973 as amended] and to provide some detail of the established and institutionalized system that exists to cover lifelong medical surveillance, diagnosis, and compensation in the event of certification of an occupationally acquired disease. This legislation is something that should be taught before a miner steps into the first shaft lift that takes him underground.’ It is not.

An even less recognised health issue is the impact mining generally has had on the HIV/AIDS epidemic in South Africa, where the spread of HIV/AIDS (Epstein 2002) within and beyond South Africa has been attributed to mining employment practices and the transience of the labour force, with many foreign miners returning to their impoverished communities in other southern African countries, ill with AIDS or other mine related diseases, and with no recourse to compensation or health care.

Turning to ecological health, in 2004 South African carbon dioxide emissions from coal mining were estimated to be 440 million tonnes (mt) with Eskom accounting for over 40 per cent of that (Hallowes and Munnik 2007: 12). Emissions have increased since and will go on increasing. The figures in the following table (7.1) ‘underestimate the emissions’ (Hallowes and Munnik 2007: 12) but they give an indication of coal consumption and carbon emissions for 2008, and the rate of increase since 2000.

Table 7.1 Production, Coal and Carbon

⁵⁵ Difficult or laboured breathing and shortness of breath

	<u>2008</u>	<u>2004</u>	<u>2000</u>
Production (GWh)	222,366	206,799	178,193
Coal consumed (tonnes)	125,300,000	109,600,000	92,500,000
Carbon dioxide (tonnes)	223,600,000	97,700,000	61,200,000

Source: Hallowes 2009: 12, adapted from the 2008 Eskom Annual Report.

Creamer (quoted in Bond and Dada 2009) contends that if coal consumption increases in line with capacity, Eskom will burn around 218 million tonnes when the current projects become operational and emit 390 million tonnes of CO₂. But Eskom itself is talking about ‘a possible demand of 374 million tonnes a year by 2018 if a third new coal fired plant is built’ (Martin quoted in Hallowes and Munnik 2009: 13). It has been estimated that 40 new coal mines will be needed to service the demands of coal fired power stations, once the new Medupi and Kusile stations are operational in addition to the 64 currently operating (Department of Minerals and Energy 2010).

Other costs of coal mining and of beneficiation of coal in South Africa are the approximately 60 million tonnes per annum of discard coal, which is estimated to have accumulated now to more than 1 billion tonnes (Department of Minerals and Energy 2009). These discards have a number of damaging environmental consequences, including the leaching of acids and toxins into the soil and water ways and the spontaneous combustion of slag heaps, emitting carbon dioxide and other gases into the atmosphere. The slagheaps are also particularly unsightly and are dotted throughout the countryside in coal mining areas – and will continue to have a damaging impact on the environment well into the future. Oelofse (2008) for the Council for Scientific and Industrial Research (CSIR) has indicated that acid mine drainage (AMD) is the single most important environmental concern from mining activities. He writes that ‘the decant of AMD is likely to persist for centuries to come’ and the ‘legacies of the historical sites will remain problematic for many years to come due to the vast magnitude of the associated impacts, a problem which

continues due to institutional fragmentation’ and the fact that roles and responsibilities remain only vaguely defined (Oelofse 2008: np).

Other negative impacts of coal mining on land and water are on market gardening, farming, and tourism, with visual, noise and air pollution effects spreading over a physically much greater area than that of the mining site. The history of conflicting interests over water usage in South Africa is well documented by Hallowes and Munnik (2007) with industry having both a ‘voracious appetite’ (Hallowes and Munnik 2007: 103) for water and also being responsible for high levels of contaminants in rivers, wetlands and the underground water table. Mining has also contributed to the disappearance of wetlands and the damming of rivers.

In summary, the economic benefits in terms of capital accumulation are considerable but the vast majority of these benefits flow only to the well-off. The effects on the ecology have been devastating and would cost billions to rectify. The costs hit the poor more than the well-off. These adverse effects will continue unless a different model of human development is found.

7.3 Example 1: The South African government, Eskom and the World Bank

I will now turn to an issue which is one of the most significant developments in South Africa’s recent energy history and which illustrates the further implementation of the neoliberal development programme in South Africa, despite the enormous social and environmental costs attached to it.

The World Bank’s Strategic Framework on Development and Climate Change (quoted in Redman 2008) expresses the case for urgent action on global warming. It claims that global warming has the potential to undo the development gains made in recent decades in many countries, no matter how much money is spent trying to achieve the United Nations’ eight poverty reduction Millennium Development Goals. However, as Redman (2008: np)

writes, 'the Bank does nothing substantial to prioritize 'new' renewable energy sources, or decentralized, locally driven mitigation of adaptation efforts'.

Redman adds that the World Bank Group increased lending to coal, oil and gas by more than 90 per cent from 2007, and lending for coal alone increased by 256 per cent in 2007.

In 2010, South Africa was one of these beneficiaries of World Bank loans for coal power. This section looks at this loan, who will benefit and what it means for both South Africa in the context of the political economy of global warming, and the World Bank, as one of the leading institutions at the international global warming negotiating table.

In early 2010, Eskom applied to increase electricity tariffs to help to fund Eskom's expansion programme. At the same time, the largest industrial users continued to be exempted from paying an equitable share of electricity costs due to Special Pricing Agreements which were set up in the last days of the apartheid regime just before the handover of power in 1994. Under these agreements, corporations such as Anglo American Corporation, BHP Billiton, Arceleor Mittal and others are paying less than R0.14/kwh (6.7 Rand = \$A1 approx. in Nov. 2010) which has resulted in major inequities for domestic users. For example, McDonald, (2009: 89-90) presents figures which show the residents of Soweto (a major township just outside Johannesburg) paid 30 per cent more for electricity than nearby white suburbanites, and that there is full cost recovery in domestic use, which is 700 per cent more than what some large corporations are paying. Statistics on domestic disconnections – due in large part to inability to pay - are difficult to come by, but McDonald (2009) suggests that there have been times since 1996 when the number of disconnections are greater than the number of connections. Eskom's response has been to introduce pre-paid meters in poor areas. McDonald writes that this allowed for the logic of capital to ensure the consumers, who had social rights to electricity, paid for it. He quotes Raniero Panzieri (1980 from McDonald 2009; 243): 'science, the gigantic natural forces, and the mass of social labour ...[are]... embodied in the system of machinery, which together with those three forces, constitutes the power of the master ...[and the new] "technical

bases” progressively attained in production provide capitalism with the new possibilities for the consolidation of its power’.

Between October 2007 and February 2008 South Africa experienced major power supply interruptions and load shedding, forcing the temporary closure of mines and aluminium plants. In the wake of this, and seemingly as a result, in 2008 South Africans were informed that the World Bank was going to lend Eskom US\$5 billion, the largest World Bank loan ever in Africa, for an electricity expansion programme. (A table of Eskom’s current and planned coal fired power stations is provided in Table 7.2.)

A concerted effort by civil society organisations was mounted against the loan based on a number of concerns, including those related to global warming (discussed in more detail below). Lack of clarity around the loan persisted until 9th April 2010 when, perhaps with a little irony just four months after the Copenhagen Climate Change Conference, the World Bank announced the awarding to Eskom of a US\$3.75 billion loan to co-finance the building of what will be the world’s fourth largest new coal fired power plant, the Medupi Power Plant in Lephalale, Limpopo Province. Concurrent with this, Eskom applied to NERSA to increase electricity prices by 34 per cent to domestic consumers to help to fund a proposed R345 billion capital expansion programme, over the subsequent five years (SouthAfrica Info. 2009). Eskom was granted a 25 per cent price increase for each of the following three years.

Table 7.2 The New Build: Eskom’s Current Projects

Table 2: The new build: Eskom's current projects

	Technology	Name and location	Megawatts (MW)
Peaking Plant	OCGT	Ankerlig, Atlantis, Cape Town.	2,080
		Gourikwa, Mossel Bay, Western Cape.	
	Pumped storage	Ingula, Van Reenen, KZN / Free State.	1,352
		Tubatse, Limpopo / Mpumalanga.	1,500
	Wind	Sere	100
Total			5,032
Coal fired base plant	Expansion	Arnot	300
	Return to service of mothballed plant	Camden, Ermelo, Mpumalanga	1,520
		Grootvlei, Balfour, Mpumalanga	1,170
		Komati, Middelburg / Bethal, Mpumalanga	955
	New coal	Medupi, Lephalale, Limpopo	4,764
		Kusile, Witbank, Mpumalanga	4,800
Total			13,509

Source: Eskom CEO Jacob Maroga: Presentation to the Media, 23 January 2009.

(Source: Hallowes 2009:10). Hallowes (2009) writes that these already initiated projects will add a further 18,540 MW of capacity by 2017 – and this is what the World Bank loan is supporting.

The World Bank has a history with Eskom. Between 1951 and 1967, at the heart of the apartheid years, it lent \$100 million to Eskom. Victims of apartheid are now seeking reparations in the US and European courts from international banks that made money from the profits related to these loans as they did not develop or supply power to any black communities in South Africa. Bond (2010) writes that the Bank co-authored the 1996 Growth, Employment and Redistribution (GEAR) programme (as discussed in Chapter 5), which was also detrimental to the majority with, black incomes subsequently falling below 1994 levels while white incomes grew by 24 per cent.

Up until this time, due to both the conditionalities that are enforced by the World Bank and African countries' sensitivities to being caught in debt traps, South Africa post-1994 had not accepted any loans from the World Bank. So this \$3.75 billion loan is a first for post-apartheid South Africa. In fact, with the end of the Mbeki government in 2009, the Zuma government has adopted a different attitude to the World Bank and its conditionalities. While the conditionalities for the \$3.75 billion loan have not yet been disclosed (and may

never be), it is to be expected that they will further cement South Africa's economy into programmes of privatisation and liberalisation, a reduction of spending on social services, a lowering of tax on the wealthy, further privatisation of state industries and further reduction of tariff barriers, opening the economy yet further to multinational corporations. Swilling (2010) argues that the loan gives the World Bank what it really wants and has never had before, a firm grip on the South African economy and influence over economic policy.

In 2001, in a policy announcement, the World Bank stated (quoted in Bond 2002: 318):

The Bank will focus on countries which demonstrate – through actions – a credible intent to privatise and to liberalise ... liberalisation of power supply will be pursued through privatisations and the removal of legislative and commercial barriers to public/private partnerships.

In other words, as found elsewhere (see Hanieh (2011) in relation to Iraq, Afghanistan and Egypt), the World Bank and the West's support for the neoliberal agenda of promoting Public-Private Partnerships (PPP) follows a pattern of outsourcing previously state run utilities and services to private companies and is a form of state-sponsored private accumulation. One of the conditions of the South African loan agreement is that Eskom will privatise 30 per cent of its generating capacity, in other words a further public expense for private gain.

The history immediately preceding the World Bank loan is revealing both because of the strength and breadth of opposition to it by civil society groups and because of the covert nature of the loan application and conditions. Arguments for the loan from business and political sectors have been that South Africa had no alternative: South Africa would be plunged into darkness and the economy would come to a stand-still if new coal powered energy wasn't generated (Jacks 2010). It was argued the loan was needed to enable universal access to electricity in South Africa. The argument maintained that

the country needed the Medupi coal-fired plant by 2012 and Eskom indicated that technologies which reduced carbon emissions would be built into the plant.

Internationally, more than 200 civil society groups, including 60 South African groups (Bond 2010), criticised Eskom's loan application. Opponents of the loan prepared extensive evidence and arguments in opposition and, in doing so, were very critical of the government's support for the loan, the World Bank's lending record and the role it has been playing as the major international climate change lending agency. It is important in gaining more understanding of the workings of neoliberalism in this example to look more closely at the basis of this opposition.

Hallowes (2009: np) writes on this proposed deal of 'the shocking record of World Bank oil loans to Africa [which] tells [the] story [of how] 80 per cent of projects that the World Bank invested in between 1992 and 2003 were designed to export oil to Western Europe, Canada, the U.S., Australia, New Zealand and Japan' and that, coupled with this, 'South Africa's energy and carbon intensive export-led economy, an economy in which 80 per cent of energy is used by industry and commerce, belies the argument that the loan has anything to do with universal access to energy by domestic consumers'. With the very explicit support of the World Bank, that economy is thus developing in a way that is completely contrary to what is needed to address the needs of the poor majority, or global warming.

In a Third World Network Report (2010), it was suggested that the main beneficiaries of the loan would be multinational corporations BHP Billiton, Anglo American Corporation and other energy intensive industries which already benefit from some of the cheapest energy in the world. That report states that the loan would not alleviate poverty nor increase domestic users' access to electricity and would exacerbate people's energy poverty, in part through disconnections due to price increases (to pay for the loan and Eskom's expansion programme). In effect, the South African poor majority were locked into a debt they did not want but will have to pay for in the short term through

increased electricity prices, and in the longer term, to cuts to social services, declining environmental conditions and, eventually, for the cost of carbon emissions. The costs of the loan repayment will mean less money is available for more community-friendly energy and services. An example of one response to this has been by the community organisation, the Soweto Electricity Crisis Committee, which was formed in 2000 to fight against Eskom's cutting the electricity supply to 20,000 houses per month in Soweto as part of its cost recovery program (Africascan 2008).

The Medupi power station alone will emit an extra 25-30 million tons of CO₂ per annum (Hallowes and Munnik 2009), with additional fugitive carbon emissions from the opening up of new coal mines and additional transport upon which it depends. The argument that South Africa has carbon emission space because it has large scale poverty to overcome is a red herring. South Africa's per capita emissions of 9.8 tons of CO₂ are as high as the UK's (Hallowes and Munnik 2009), but very unequally sourced.

Earthlife Africa and Oxfam International (2009) has argued that the power plant will benefit mainly large mining and metallurgical industries. Hallowes and Munnik (2010) state that the new power plant and its associated 127 per cent electricity price increases for poor people over the next four years, indicate that the World Bank still gives preference to multinational fossil-fuel capital over poor people. The South African Faith Communities' Environment Institute (SAFCEI 2010) maintains that the electricity produced by Medupi will be for export-based industry, which continues to benefit from secret contracts that provide it with electricity that is below the cost of what it costs Eskom to produce it.

I have not been able to find any cost-benefit studies on coal fired power stations compared to other energy sources. However, as Sharife (2010) writes: '[i]ronically, the difference between the capital costs of the 5,000MW wind project, and 3,600–4,800 MW Medupi whose total costs stand at US\$16.6 billion, is US\$3.5 billion – almost the full World Bank loan'. This is not taking into account the continuing costs of coal purchase or the costs of future carbon

emissions for coal fired power. Decisions on these developments are being based on analyses provided largely by Eskom which has a clear vested interest in maintaining the coal energy *status quo*, while the informed (on energy) community voice is not being taken into account.

The World Bank loan is US dollar-based so that if the Rand weakens in relation to the dollar, the most likely scenario, the size of the loan will increase. It also means that Eskom, or the South African government which underwrites the loan, has to earn foreign currency to pay back the loan. This, according to Hallowes and Munnik (2010), means that there is yet a further entrenchment of the export-oriented economy in raw materials ‘an economic model that has consistently failed, for the last hundred years, to eradicate poverty in the country’ (Hallowes and Munnik 2010: np). Thus there is an inherent paradox in Eskom securing a loan that both supports and requires an export-oriented economy based on cheap raw minerals extraction which in turn requires cheap electricity.

Coal mining, beneficiation and power production require significant quantities of water. The building of the Medupi plant will affect future water supplies and air quality around Medupi. The environmental and social consequences of this development will impact on the major water catchments, as the Limpopo, Vaal and Senque (Orange) Rivers are all going to have their water diverted for Medupi and future power stations. The South African government already acknowledges that the Waterberg will exceed its air pollution-carrying capacity in future.

South Africa has had a contentious experience in relation to water management on a previous occasion with the World Bank. In 1999, World Bank economist John Roome advised the South African water minister to impose a market price for people who could not afford water. According to Bond (2010a: np) such an approach earlier resulted in a cholera epidemic killing hundreds and ‘[s]imilar misery will follow the Eskom loan.’ Medupi will be built in a water-scarce area where communities are already confronting extreme mining pollution.

Another dimension of concern regarding the World Bank loan is that the ANC will benefit financially from the construction of Medupi (through its Chancellor House investment in Hitachi Power Africa) and hence from the loan. Hitachi Africa is 25 per cent owned by the ANC's investment arm, Chancellor House, and, as a partner in the consortium constructing the Medupi power station, was awarded a R38bn Eskom contract (Bond 2010a.) When former chairman of Eskom, Valli Moosa made the decision to award the R38bn Eskom contract to Hitachi for the building of Medupi, Moosa was a member of the ANC national executive committee, a very clear conflict of interest. It has been widely claimed (Zille 2010: np) that the ANC will make an estimated R1 billion from the building of the power station 'enough to fund its election campaigns and the lifestyles of its leaders for years to come', bringing about a situation which the leader of the Democratic Alliance party, Helen Zille claims will be where 'no opposition party may ever be in a position to compete fairly with the ANC again' (Boyle 2010). The ANC will entrench its single party dominance and, in doing so, weaken South African democracy.

It will not be the ANC who have to pay back the loan. It will be the people of South Africa. The World Bank loan in summary is an illustration of World Bank hypocrisy and the determination to consolidate further a particular, destructive, neoliberal economic model on South Africa. The World Bank loan is an illustration of a lost opportunity to invest in more equitable, environmentally benign energy infrastructure directions.

7.4 Example 2: Coal of Africa (CoAL)

One of the immediate outcomes of the building of the new Medupi power station is the increasing demand for coal, and thus coal mines. One area which is being more intensively and extensively surveyed and mined for coal is in the Limpopo Province.

One company involved in this expansion programme is Australian company, Coal of Africa Ltd (CoAL), which is expanding its mining activities to the environmentally, historically and culturally highly sensitive northern Limpopo

region of South Africa. CoAL is a company concerned only with capital accumulation and the links to government which encourages such development at great environmental and social cost, with little or no benefit to South Africa. This study of CoAL provides an opportunity to take a more micro look at the negative consequences of coal mining, and an indication of the drive under the neoliberal policies of the South African government to push coal developments with seemingly no concern for the impact this will have on global warming, on the local environment or the health of the people.

The geographic focus here is the Limpopo Province, one of the main mining provinces, and not coincidentally, one of the poorest in South Africa. Within the Limpopo Province, there are two main coal mining regions, one near Lephalale in the Waterberg area and, more recently undergoing development, the northern part of the state near the Limpopo River border with Zimbabwe. The latter is where CoAL has been developing its Vele colliery.

The Limpopo Province is part of a larger Limpopo Basin which includes parts of Botswana, Zimbabwe, Mozambique and South Africa. As a consequence of this being a very poor region, the Limpopo population has high illiteracy and unemployment levels, particularly in the rural regions where 89 per cent of the population live. People rely heavily on agriculture and the natural habitat for food security. In recent years, drought has been more frequent (Anteneh *et al.* 2004) impacting on food and water security. Mining, agriculture, trade and tourism all have to try to survive together but all compete for land and scarce water.

Within the Limpopo Province, the Waterberg Biosphere Reserve was UNESCO-registered biosphere 2001. The area is a Ramsar Wetlands (covered by the Ramsar Convention on Wetlands, an international treaty for the conservation of wetlands), extending over 400,000 hectares of the arid bushveld which is dominated by different veld types, including tropical grasslands and savannas, low mountains and escarpments and poor soils. About 80,000 people currently live in the biosphere reserve – raising cattle,

growing crops, farming game and promoting tourism. It has been inhabited for hundreds of thousands of years and is an important San rock art area.⁵⁶

This area is now a major focus of coal mining companies. Coal in the Waterberg area lies beneath approximately thirty metres of overburden, which is considered shallow and therefore suitable for the relatively cheap, but environmentally more destructive, open cast mining. It is also where Eskom has commenced building the new power station supported by the World Bank loan, the Medupi Power Station, near Lephalale. Contrary to assessments of peak coal globally by Aleklett (2010), it has been claimed that the Waterberg area has enough coal for the next 150 to 200 years to fire eight power stations (CSIR 2009). The Exxaro company has the world's largest open cast coal mine here, a mega-mine; a 3.2 kilometre-wide, 110 metre deep (Schalk 2011: np) swathe cut into the land. Visiting it, I was told by an Exxaro employee that it was going to be 'driven all the way to the Botswana border, where it will meet up with another open cast mine'. The impact will be to turn this area into a vast black, tailings-strewn, toxic, lifeless and unrecoverable waste-land.

To come back to CoAL's operations, however, we return to the northern Limpopo. CoAL is a company incorporated in Western Australia and listed on the stock exchange in 1980. It is described on its web page (www.coalofafrica.com) as being focused on the acquisition, exploration and development of thermal and metallurgical coal projects in South Africa. The company is now also listed on both the London and Johannesburg stock exchanges. This section focuses on the recent and controversial development of the Vele coal mine although many of the issues raised are broadly common to all coal mine sites in middle and low income countries and highly pertinent to the political economy of coal mining in South Africa.

⁵⁶ The San people are the Indigenous hunter gatherers of South Africa.

Map 7.1 The Vele Mining Site near Mapungubwe in Limpopo Province



Source: van der Merwe (2009)

The Vele coal mine site is adjacent to both the world heritage site of Mapungubwe (see Map 7.1), and the confluence of the Limpopo and Shashe rivers which delineate the borders between South Africa and Botswana and Zimbabwe. I visited this site in 2009 and witnessed a place of pristine and unique beauty and peace. Foremost among the concerns of opponents to the mine is that it is adjacent to this world heritage site which is of great historical significance to all of humanity with outstanding examples of San rock art and various ancient artefacts. It was in the Shashe-Limpopo river basin that the first complex society in southern Africa developed (Huffman 2008). There was also a hub of trade between African regions, China and southern Africa. Today there are numerous archaeological sites dating from the early, middle and late Stone Ages as well as the Iron Age sites found in the Mapungubwe National Park. It is difficult to exaggerate the value of this place in terms of its beauty and its historical and environmental significance. It is also located in the proposed Limpopo/Shashe Trans-frontier Conservation Area (TFCA) which straddles South Africa, Botswana and Zimbabwe. This TFCA has the potential to be developed as a reservation for the Big Five (lions, leopards, rhinos, elephants and cape buffalos) and for bird and plant life generally.

The Vele mine's boundary will be just seven kilometres east of the Mapungubwe National Park boundary, while the coal processing plant infrastructure is planned to be 27 kilometres from the Mapungubwe World Heritage Site. The Vele coal mine site covers 8,000 acres and will involve both underground and open cast mining of the estimated 720 million tons of coal at the site. Prospecting continues to be conducted on farms throughout the surrounding area (Hatty 2009), indicating intentions of expansion by the company, with retreat on the part of some farmers in the area through the sale of their properties.

According to CoAL's web page, the company was granted an unconditional New Order Mining Right on 2nd February 2010, stating that CoAL planned to develop Vele in two phases: phase 1 commencing in the first quarter of 2010 with the establishment of a modular coal treatment plant; and Phase 2 eventually producing 5 million tonnes a year of coking coal. The coal will initially be transported from the mine to the railhead by truck. It will take 18 months to complete the rail spurs and loading facilities, which lie about 40 km from Vele and 25 km from Makhado, the local capital.

The capital expenditure for phase 1 is 450 million Rand (approx. US\$61 million). Contracts for hard coking coal for this project have been settled at US\$200 per ton. There is clearly a lot of money in coal, the majority of which will go to CoAL with little or no long term benefit to the region.

CoAL's partners have changed since I began to research this example. In 2009, CoAL's Vele project had a Black Economic Empowerment (BEE) partner, Mvelaphanda Group, which previously was headed by Tokyo Sexwale (a former high level ANC member) before he was appointed to the Cabinet of the South African Government. Mvelaphanda now owns a stake.

Opponents of the mine have mounted a legal case, based around concerns for the protection and maintenance of the environmental integrity of the area around Mapungubwe. Furthermore, on 5th August 2010 the Department of Environmental Affairs (DEA) confirmed that it was issuing an immediate

Compliance Notice to CoAL to cease its activities. This notice related to CoAL's non-compliance with the provisions of the National Environmental Management Act (NEMA) in that, without the required prior environmental authorisation, CoAL was said to have commenced activities listed in the Environmental Impact Assessment (EIA) Regulations promulgated in terms of the NEMA. These activities included the road construction, the storage of dangerous goods, activities too close to the flood-line of the Limpopo River, the construction of a sludge dam and a water pipeline network. It is apparent however that this was a mere technicality for the company and the government department to overcome and that the mine would go ahead. In April 2011, it was reported (Latham 2011) that CoAL still faced a challenge from environmental groups on the basis that the company had 'grossly underestimated the quantity of water it required for the Vele colliery', thus affecting the flow of the Limpopo river.

After having their water licence initially withdrawn due to breaches in water use by the company, CoAL has recently been granted a water use licence by the Department of Water Affairs. According to opponents, the granting of the licence was done without the Department of Water Affairs fully reviewing and evaluating the submissions by all parties. Since the South African government's about-turn on the closure of Vele, opposition groups including the Association of Southern African Archaeologists, the Endangered Wildlife Trust and the Wilderness Foundation have undertaken to continue action to close the mine, threatening to take their argument to the High Court if necessary.

Opponents of the mine have submitted an appeal to the water tribunal to investigate more fully the awarding of the licence. At the same time, the World Heritage Commission is currently evaluating the status of the Mapungubwe region and will announce its decision in July 2011. Meanwhile, according to opponents of the Vele project, the lawyers for the coal mine are doing everything to delay a High Court hearing of the interdict against the awarding of a New Order Mining Right (NOMR) which would decide the fate of Vele.

However, as CoAL's CEO, John Wallington has indicated, his company 'continues to work closely with various government departments to resolve the challenges at the Vele Colliery [and] remains confident that any issues identified can be satisfactorily resolved allowing for the commencement of operations at the colliery in 2011' (CoAL 2010: np).

CoAL's CEO is confident it will soon be resuming mining at the Vele site and have invested heavily in further infrastructure, trebling the size of CoAL's export allocation in Mozambique's Maputo harbour in anticipation of Vele's continuation, along with other CoAL mine operations in Limpopo Province. The state-owned transport company, Transnet, is also continuing to invest in infrastructure to service the Vele mine, developing the rail line to provide additional capacity, in anticipation of the Vele mine's operation, indicating the confidence held in official circles in relation to the operation of the Vele coal mine, no matter the consequences or the opposition.

The additional coal mining activity at Vele, when added to other mining activity in the region, will have a compounded adverse effect on the fragile Limpopo ecology, especially with respect to water. This is expressed by Ashton (2009: np), a researcher with the CSIR who writes:

[T]he Limpopo River basin is particularly water-stressed. Every tributary river in the basin has been exploited to the limits possible by conventional engineering approaches. Efforts to meet society's demands for water for domestic, irrigation, mining and industrial uses have caused a progressive deterioration of the aquatic ecosystems. Additional [pollution] from the planned new coal mines and power stations in the area and the development of new towns to house the employees of mines and power stations, will only exacerbate the already poor water quality situation and accelerate the rate at which aquatic ecosystems deteriorate. There is simply too little water available in the basin to support projected developments and new supplies of water will have to be brought in via inter-catchment transfers.

A part of the travesty in this study of CoAL is that, in reality, it is a struggle which is being acted out not just here but on many stages – both micro and macro - across the globe, around the competing forces of economic growth, the commodification of the land and the accumulation of profits in an environment dominated by the imperatives of neoliberal capitalism juxtaposed to the ecology, issues of poverty and inequality, history and culture. It is a struggle whose urgency and potency is heightened by global warming. The hegemony of the neoliberal economic growth imperative prevails because the forces at play are very unequal both in the South African context but also globally. This is true of so many other countries even if it is less immediately apparent. As CoAL illustrates, such companies have significant resources and influential networks to draw upon to win their objectives. Community opponents to such developments are often more poorly resourced and fragmented. More importantly though, in South Africa the corporations have also won over the state to their corner. Regulation is no answer when the rules of the game are set by the corporate captured state.

The conflicts over the huge acreage of South African land which is under mining use or subject to mining licence applications are immensely significant, with large numbers of people and species suffering the cumulative impact of mining on water, land, air and food production. In a neoliberal world, to put the biological, social, community and historical richness and diversity of South Africa up against the coal owners and the government, there can be but one winner. To make progress at this level, to win respect for the ecology, to shift the balance of the debate on global warming requires structural change.

7.5 Conclusion

This chapter has pointed to some real concerns about the prospects for South Africa addressing global warming and the seeming impossibility of that in a political and economic environment which is driven by capitalist social relations of production and a political economy dependent on capital accumulation. Before considering this in the wider context, however, the

chapter has drawn attention to some of the conflicts of interest and corruption that exist in this frame of political economy within the ANC, the coal mining industry but, perhaps most crucially of all, at the global institutional level. This is also illustrative of the argument that it is not just African governments that are corrupt, for their corruption is dependent on equally corrupt, and often more powerful, partners. Indeed the 2010 Eskom World Bank loan has been criticised as making a complete mockery of the World Bank's own efforts in tackling corruption and promoting good governance. Ironically, in the World Bank report, *Africa Development Indicators 2010*, Devarajan (2010) writes about the “quiet corruption”, the failure of public servants to deliver goods or services paid for by governments and how it is pervasive and widespread across Africa and is having a disproportionate effect on the poor, with long-term consequences for development. This is probably very true; however, it is the corruption at the global institutional level that is most significant in terms of the potential for humankind to have or not have, a future.

The vignette on CoAL shows how the entwinement of the political and economic elite and their interests in South Africa are dominant. Lying behind all of that, and most important of all in examining the political economy of global warming in this country which, as stated, is a microcosm of the global economy, is the drive to produce, and in turn consume, more and more coal-based energy. This is the root problem or more accurately the root symptom of a political economy that has both created global warming and has no capacity to stop it.

Hallowes (2009: 28) concludes that the World Bank loan and Eskom's government-endorsed expansion programme represent a case of ‘recreating the logic of an economy that is internally subordinated to the interests of the minerals and energy complex and externally subordinated to the imperial market’. It effectively enables South Africa to export cheap electricity (or continue sweet-heart deals with multinationals for below cost electricity) while suffering a shortage of affordable electricity for ordinary people at home. The building of further aluminium smelters, growing the economy through attracting an energy-intensive and highly polluting beneficiation industry and

continuing to supply cheap/underpriced electricity to the MEC is a very short-sighted and irresponsible road to economic development, even without global warming. With global warming, it is a tragedy.

CHAPTER 8 South Africa: conclusion

8.1 Introduction

This study has connected the coal and electricity sectors with the expansion of capitalism in South Africa and Africa through the perspective of the political economy of global warming. Chapters 4 to 7 have provided empirical evidence exposing the myriad of issues in the pursuit of ‘electric capitalist’ development in South Africa, the perpetuation of poverty, inequality and uneven development within South Africa and Africa, the expansion of capitalist social relations of production throughout the African continent on the back of electricity expansion, and the destruction of the environment; in short, a deepening of the divide between humans and between humans and nature. The key environmental concerns of this thesis is South Africa’s growing carbon emissions. South Africa, like China, Brazil and India, argues that industrialisation and growth are essential to lift the poor from poverty; in South Africa, growing inequality indicates this is yet another case of the rich and powerful hiding behind the poor.

The study has also argued that South Africa, as the hegemonic power in sub-Saharan Africa, the ANC government, with its adoption of neoliberalism as the model of development, and the MEC and financial sectors with their imperative for expansion, are all parts of what is driving the expansion of neoliberal capitalism throughout southern Africa. A consequence of all of this is a further weakening of the adaptive capacity of the people. In this sense, South Africa can no longer be considered as being on the periphery of global capital but rather better be viewed as in its own right an imperial power on the African continent. The South African state, by pursuing a particular economic trajectory, has deepened and entrenched poverty and inequality in South Africa. At the same time, it has developed a sophisticated and globally connected economy that is intimately involved in the process of capital accumulation through the push, by the merged interests of state and private capital, into the rest of Africa. As Satgar (2009: 52) writes, ‘[t]he macro-

restructuring project on the African continent through the AU[African Union] and NEPAD [New Partnership for Africa's Development] is further deepening Africa's integration into the global political economy'. This is being mediated by class interests, in particular the role of a transnational faction of the African ruling class. The ideological outlook and strategic orientation of the elite are expressed through the maintenance of a neoliberal economy, the growing gap in wealth and security between those who benefit and those who carry the burdens of capitalist development.

South Africa's former President Thabo Mbeki was the key driver behind the formation of the AU, NEPAD and the Southern African Development Community (SADC), all neoliberal institutions with the twin pillars of their agendas being accelerated economic growth and economic integration of African national economies into the global economy. There were always concerns by South Africa's neighbours regarding the formation of these essentially transnational economic organisations that these were signs of South Africa's 'gigantism' and ambitions of fulfilling the role of 'domineering hegemon' (Landsberg 2007). These concerns would seem to be wholly justified.

The study of South Africa has drawn attention to the historical processes of capital expansion, racism and the political and economic power structures which underpin and drive energy policies in South Africa. That country is of special interest in that members of the post-1994 black political elite were part of the leadership which fought in the struggles against apartheid and which in the ANC adopted many principles from socialism in designing the blueprint for the post-apartheid majority rule government. However, not all in the ANC were socialists. There was a hard core with neoliberal ideological persuasion who also influenced the framework for Black Economic Empowerment. Many of the ANC political elite are now entwined with the powerful economic interests in South Africa and beyond on the continent. They have become integral players in the neoliberal expansionist project, as well as being intimately involved at a personal level in patronage, personal benefit and

corruption. As Franz Fanon warned⁵⁷, the dangers of co-option of revolutionary goals by [neoliberal] capitalist policies amongst those ushering in the new order are real. This is precisely what has happened in South Africa.

The fundamental issues emerging from this study however revolve around the contradictions between, on the one hand, African ecological sustainability and, on the other, the pursuit of neoliberal capitalist industrialisation within South Africa and throughout Africa. The continuing spread of capitalism outwards from South Africa and throughout the African continent is both harbinger and guarantor of global warming catastrophe and ecological collapse for both South Africa and the continent. The expanding capitalist social relations of production will not only increase the continent's carbon emissions, but the wealth and growth created from this form of development will continue to benefit only the minority, while further locking in global warming, environmental destruction, economic insecurity and declining (global warming) adaptive capacities.

Fine and Rustomjee (1996), and later McDonald (2009), have theorised around the links between energy and capitalism. This study has taken these links and intersected them with the political economy of global warming, particularly through the prism of the coal and electricity sectors in South Africa. Fossil fuel energy emerges as being central in powering capitalism's engine. Like all the fossil fuels, coal is particularly well suited to the capitalist mode of production for a number of reasons. First, it can be privately owned; second, it is a concentrated form of energy; third, it is easily transported; fourth, in the case of South Africa, it is readily accessible and seemingly in abundant supply; and fifth, the private capital in mining coal is structurally linked to public capital through contracts to supply the coal fired power stations, thus guaranteeing substantial profits. Ignored however are the so-called 'externalities' of the private market: pollution, health problems, impoverishment, the cumulative effects of land degradation, water consumption in a water-constrained

⁵⁷ From a quote from Lewis Gordon, Professor of African Studies, in *Monthly Review*, July 2002, in a book review of Ashwin Desai's *We Are the Poors: Community Struggles in Post-Apartheid South Africa*.

environment and toxification of land, water and air. These are borne by the people, communities and the environment. On top of these, there is the impact of carbon emissions and their contribution to global warming. The existence of these externalities demonstrates the contradictions that exist between fostering the interests of the environment and those of the neoliberal economy and, in turn, between those of the economy and those of society. The cumulative effects of these externalities, those things that neoclassical economics cannot or will not handle, now threaten life on Earth, the ultimate contradiction of capitalism.

8.2 Timeframe for coal production

South Africa's intense energy usage, and its dependence on coal for that energy, have enormous ramifications for the country's future development path, the nature of that path and for global warming. As has been demonstrated in this part of the thesis, South Africa's coal is integral to the energy sector and the energy sector is integral to its economy. However, despite government and coal industry claims that South Africa has sufficient coal to last 200 years, various studies indicate that South Africa's coal production is close to peaking, perhaps as early as 2011 (Rutledge 2010; see also Aleklett 2010). This will mean more expensive coal and probably yet more environmentally damaging mining practices. It will also mean huge investments have been made in coal-dependent infrastructure at a time when such investments should be being made in transforming that energy structure to one that is more environmentally benign. Eskom will invest an estimated R175 billion (about \$A30 billion) over the next 20 years to try to ensure sufficient supplies of coal (Flak 2011). Despite both peak oil and global warming, a massive, coal-intensive energy infrastructure expansion programme is being undertaken, locking South Africa into an economically and environmentally disastrous future.

This is clearly a momentous time in the energy sector in South Africa. This expansion programme has just got underway, yet if coal production is peaking, this energy programme is likely to end up being a hugely expensive white elephant, not able to provide the energy the country might need for the path it

has chosen. The loan repayments to the World Bank will still have to be repaid by South African citizens. It has also tied future generations of South Africans into being dependent on a growth economy, which may well turn out to be a suicidal path with respect to global warming. Here the capital accumulation imperative, and its impact on global warming, are perhaps best described by the phrase used by Istvan Meszaros (2001) of capital's 'destructive uncontrollability'.

Hallowes (2000: 28) concludes that the World Bank loan and Eskom's government-endorsed expansion programme represent a case of 'recreating the logic of an economy that is internally subordinated to the interests of the minerals and energy complex and externally subordinated to the imperial market'. It effectively enables South Africa to export cheap electricity (or continue sweet-heart deals with multinationals for below cost electricity) while suffering a shortage of affordable electricity for ordinary people at home. The building of further aluminium smelters, growing the economy through attracting an energy-intensive and highly polluting beneficiation industry and continuing to supply cheap/underpriced electricity to the MEC are very short-sighted and irresponsible roads to economic development, even without global warming. With global warming, it is a tragedy.

8.3 The electricity problem

It is claimed that South Africa is in the midst of an energy crisis due to 'years of mismanagement, political interference and horrendous bureaucracy' (Hallowes 2009: np). To respond to this situation with a major expansion programme further entrenching unsustainable, capital intensive, coal fuelled electricity growth is a travesty. That the shortages are linked to the type of economic structures that are determined by the needs of global capital rather than the needs of the population is too often ignored in the debate around South Africa's energy crisis. As indicated, 30 per cent of the population have no or minimal access to electricity, and yet poor domestic consumers are paying more for their electricity than industry. Higher prices will arise as a result of the World Bank loan. The expansion programme will lead to further

contraction of possibilities for more equity-enhancing, localised, renewable energy systems, as well as for a development trajectory which is ecologically benign and socially just.

The study has demonstrated how coal and electricity in South Africa are central to the economy and to the accumulation of capital. The entwinement of state capital with private capital, and the amount of capital flight from the country since 1994, are enormous indictments of the South African government, of the corporations profiting from the country's minerals wealth and of the global financial institutions which have pursued the neoliberal doctrine and practices that have so clearly benefitted only elites. As Ashman *et al.* (2010: 178) write, the growing financialisation of the South African economy has produced a unique combination of 'short term capital inflows (accompanied by rising consumer debt largely spent on luxury items) and a massive long-term outflow of capital as major ... corporations have chosen offshore listing and to internationalize their operations while concentrating within South Africa on core profitable MEC sectors'. Additional to legitimate capital flows are the huge sums involved in illicit flows. Conservative estimates of these illicit flows from South Africa on average each year from 2000–2008 have been estimated to be \$US 6,092 million (Kar and Curcio 2011). Factors facilitating this flow include the proliferation of high net worth individuals and trade liberalisation, according to the report, *Illicit Financial Flows from Developing Countries: 2000-2009* (Kar and Curcio 2011). The financialisation project thus further skews the economy towards the interests of the rich and powerful elite. Any diminution of the power and size of the MEC is taken up by the growing finance sector, which has become entwined with the MEC and that sector is also heavily dependent on cheap and abundant electricity. Innes (1984: 17) writes that the 'merging of bank capital with industrial capital to create finance capital [which gives] rise to the emergence of a financial oligarchy is one of the five characteristics of monopoly capitalism outlined by Lenin'. This is a process which has gained momentum in South Africa since 1994. That South Africa is both making massive investments in electricity and increasingly becoming a high carbon zone to attract foreign investment, when South Africa and sub-Saharan Africa will

suffer profoundly from global warming, is a reflection of this power and the imperatives of capital accumulation.

There is a growing body of evidence supporting alternative, more socially just and environmentally benign energy sources in South Africa (Fig 2007; Hallowes and Munnik 2007; Oxfam 2008). While the importance of renewable energy sources has been acknowledged, relief from the current energy shortage in South Africa can only be tackled by fundamental structural changes to the political economy. It is at the level of the political aspects of energy technologies, their structural and ideological significance in relation to global warming and the multitude of social and ecological crises, that attention has to be given, if energy solutions are to be found. McDonald (2009: 437) acknowledges this aspect of the centralised, fossil fuel-driven electricity institutions in South Africa - of the 'inertia of planned investments, the enormous benefits to be gained by multinational capital, and the hard-nosed commitment on the part of South African policy-makers to an expansionist, supply-side policy agenda... [making] it difficult to create even the smallest of diversions from this electrical juggernaut'. It is no coincidence that South Africa has adopted inappropriate technologies, such as coal, nuclear and genetically modified crops⁵⁸, as all are technologies most suitable for capital accumulation. They all have embedded in them the sense of prestige, power and control that comes with large scale, sophisticated and science-manipulated technologies, rather than the smaller scale, more democratic and accessible technologies that engender diversity, resilience, improvisation, innovation, self-sufficiency, equity and justice.

8.4 The state and corruption

⁵⁸ South Africa succumbed to pressure from the biotechnology companies and is now the sixth largest producer of genetically modified (GM) crops in the world. In 'the past five years, hundreds of thousands of hectares have been turned over to planting of GM crops ... Small farmers have been supported to plant GM cotton ... but are increasingly finding difficulties with debt, low cotton prices, withdrawn extension of services and a lack of irrigation' (Fig 2009).

South Africa illustrates some of the issues regarding the notion of the state (an issue pursued further in Part III), where the state (of South Africa) is dominated by particular class and economic imperatives which revolve around capital accumulation, growth and prestige. As Fine and Rustomjee (1996) argue, paradoxically in South Africa, the same class interests can potentially be served as much by nationalisation as by privatisation. This is crucial in the South African economy and is a reflection of the merging of private and state capital, and the capture and corruption of government by leading, mostly ANC, ministers and officials. Examples of these individuals financially benefitting from their positions of political power have been given in this part, and of the ANC benefitting from the building of the new Medupi power station, in Chapter 7. Many of the ANC political elite have long been captured by the MEC and the ideology of neoliberal capitalism. These elites have been corrupted as beneficiaries of the corporate sector, often, but not only, through the institution of Black Economic Empowerment. At the same time, they are cut off from and indifferent to the people they represent. They are able to and do use the state and state-owned assets to promote their own material interests through networks of political and economic patronage, nepotism and corruption. Although this is recognised publicly as corruption, there is, as yet, no body with the power and political will to put an end to it. It is claimed (see for example Persson *et al.* 2010) that no one can expose another's corrupt practices in high offices as everyone has something on someone else.

This is not to conclude that South Africa's political elite is alone in its corrupt practices. As Ashman *et al.* (2010: 188) write: 'South Africa is obviously not alone in the use of state assets and resources to promote private accumulation. Generations of African exclusion means that political office is highly important to promoting class formation. Corruption is the result, in its many forms.'

Multinational corporations which do business in this environment are a central part of it, as was the World Bank in making its recent loan. It can be seen perhaps as an inevitable part of the process of capital accumulation and particularly neoliberalism which facilitates illicit capital flows and a

deregulation of the financial part of the economy. It can also be argued that corruption arises from an economic doctrine which offers no moral framework, no higher purpose other than to accumulate. At the centre of this accumulation of capital and wealth are the systemic linkages between the political elite, mining, energy and finance which arise in two ways: first through investments, acquisitions and mergers; and second through the movement of people in top management positions through parastatal institutions such as Eskom, and private MEC/financial entities. The institution of Black Economic Empowerment has facilitated these linkages and the flow of benefits into (black) private hands, a new development only in the sense of the inclusion of the black elite. I have argued that BEE has facilitated the structural expansion of the white elite class to include now also a small black elite, overcoming the international constraints to capital accumulation posed by apartheid, while maintaining the basic class structure of South African society.

Here it is also important to note the important historical context to corrupt governance and business practice in South Africa. Satgar (2009: 52) writes that ‘while corruption and state failure clearly exist [in Africa], the state that has really failed in the post-colonial context is an inherited colonial state that generated racial and ethnic identities. The African failed state thesis attempts to explain a social reality by being ahistorical and blind to wider external and systemic realities.’ This is an important point to consider, and a reason why the World Bank loan vignette is so important: the form that corruption takes and the extent of it are the outcomes of a particular history and global political economy structure.

It is evident that there have been considerable pressures on the ANC in South Africa from the MEC, even prior to 1994, when the MEC was winning and dining the then to-be elected ANC government. Once the ANC gained power, the collectivist content of the Freedom Charter gave way, first to the growth and profit driven interests of the MEC accumulation process, and second to the protection of the private sector ownership of the core areas of the economy, land, minerals, finance and energy. The convergence of the interests of the political elite with the corporate elite has meant that institutions, such as

parastatal Eskom and its secret sweet-heart deals with the mining conglomerates, were not confronted with any risks of being democratised from a government which was reneging on its commitments to the people.

8.5 State power and democracy

The economic and political powers of the coal and electricity sectors directly impinged on the environmental concerns about global warming, the gamut of immediately tangible environmental, governance and social issues: food and water security, health, air pollution and socio-economic issues of electricity access, poverty and inequality. They also threaten the young and already fragile democracy in South Africa. It is not just that the coal and electricity sectors are integral to the MEC, and as such at the centre of the nation's macroeconomic policies, but they are to a considerable extent driving macroeconomic policy through the enormous power wielded by such corporations as Anglo American and BHP Billiton. The corporations can only have been enhanced by the deregulation and financialisation of the globalised economy, a structural reality that enables them to move their capital and profits rapidly in and out of countries according to where the greatest profits can be made. This is a deeply disadvantageous environment for any national developmental model that is to benefit the people. It is not the corruption of the political elite that is the fundamental problem. Rather it is the construction of the state and the financialised global political economy. With regard to the former, as Harvey (2003: 91) writes, 'the preferred condition for capitalist activity is a bourgeois state in which market institutions and rules of contract (including those of labour) are legally guaranteed, and where frameworks of regulation are constructed to contain class conflicts and to arbitrate between the claims of different factions of capital.' The power of the large corporations derives in part from the weight of such large scale capital investment in the sector and the ramifications of that investment for the rest of the economy, but also, because of the state's commitment to the capitalist economic model.

There are further consequences of the major capital intensive electricity expansion programme. Not only has it provided additional opportunities for

corruption; it in turn is a threat to democratic values by bringing the World Bank, an institution at the heart of neoliberal development and expansion in Africa, into a position of influence and leverage in South Africa. Additionally, through the expansion of South Africa's electricity system throughout sub-Saharan Africa, a significant component of the infrastructure for neoliberal industrial capitalist expansion is being consolidated as effectively as a sub-imperial power being visited on its sub-Saharan neighbours.

The work of Fine and Rustomjee (1996) is clear in its account of the linkages within the MEC and between the MEC and the state. The corporatised globalisation process has, however, gathered momentum for South Africa since 1994 and has facilitated the flow of profits from multi-national mining companies back to the metropolis, in the case of CoAL, back to Australia; in the case of BHP Billiton, back to one of the enclaves of international capital. It is however outside the scope of this thesis to track these flows. To understand better however the moral bankruptcy of the neoliberal model of development, this flow of wealth to the wealthy, whether people or places, is best viewed juxtaposed with inadequate corporate tax rules and free access to minerals, the suppression of workers' claims for improved wages and conditions and the lack of the most basic services for people living in the townships. The state and its adoption of neoliberal economic policies are directly responsible for this state of affairs.

8.6 What does all of this mean for global warming?

It is of note nonetheless that, as compared with for example Australia with a somewhat comparable minerals energy complex, in South Africa there is a basis for hope in the convergence of historical and material conditions for a radical change to the political and economic structures. This hope lies in the starkness of the class inequities in South Africa; the numbers of people being burdened by rather than benefiting from the system; the clearly observable environmental degradation; the droughts and water shortages; the number of refugees in South Africa already, not from global warming necessarily, but as a harbinger of things to come; a more critical media; a stronger core of left-wing

trade unions; a more politicised and activist NGO sector; and a broader body of critical and activist scholarship. South Africa has been host to thousands of demonstrations in recent years, more demonstrations per capita than almost any other place on Earth (Bond 2010a)⁵⁹, mostly against living conditions. In South Africa there is also a bigger and longer history and consciousness of struggle which is absent in Australia. Innes (1984: 241) wrote that the large corporate sector and 'South African capitalism have achieved an awesome degree of power - but also have created a countervailing force which may well have the potential to wrest that power from them - it has produced the largest proletariat in Africa'. In South Africa the time seems right for historical, radical structural change.

In Australia, that countervailing force may never emerge. We are closer to the centre of capitalism. In this country, the neoliberal culture is not only hegemonic but the majority are benefiting from the system and are financially tied into it through share holdings, mortgages, superannuation funds and middle class, high consumption lifestyles.

South Africa is facing multiple crises as a result of its development path and the global capitalist project. Global warming will be a significant and growing factor which will interact with other crises, such as food insecurity, poverty, inequality, drought, poor governance, synergistically. Added to this will be the pressures wrought by yet more refugees and political instability in neighbouring countries of sub-Saharan Africa as increasing numbers of people are forced to leave their (ecologically) inhospitable homes. South Africa needs to change course and protect its environment, its heritage and biological diversity; recover and protect its democratic institutions; protect its waterways and land; and support and regenerate its small scale agriculture and food

⁵⁹ Bond (2010a: np) writes: 'As the June-July 2010 World Cup draws the world's attention to South Africa, the country's poor and working-class people will continue protesting, at what is now among the highest rates per person in the world. Since 2005, the police have conservatively measured an annual average of more than eight thousand "Gatherings" incidents (public demonstrations legally defined as involving upwards of fifteen demonstrators) by an angry urban populace, which remains unintimidated by the year-old government of Jacob Zuma. This general urban uprising has included resistance to the commodification of life - e.g., commercialization of municipal services—and to rising poverty and inequality in the country's slums'.

growing sectors⁶⁰. Foremost, it must protect and support its people, pull down the barbed wire enclosing the rich enclaves and give the vast numbers of poorly paid, highly exploited security and domestic workers meaningful and productive employment. South Africa needs to democratise its institutions, de-globalise, de-commodify, nationalise and redistribute its wealth, overthrow its social relations of production and become a good neighbour on the African continent, supporting sustainable, equitable and inclusive human development for all.

This chapter has drawn together a number of strands from the study of South Africa to describe how that country's coal industry and electricity sector, as parts of a complex structure straddling the financial, political, mining and energy sectors, have captured the state and is driving an agenda that is contributing to a catastrophic disjuncture between the interests of the majority and those of a small powerful national and global elite. What emerges in practice is that the coal and electricity sectors are part of an accumulation process which disenfranchises, impoverishes and alienates further the poor. At the same time it destroys the broad ecology with the result that there are declining natural resources for the poor to fall back on for survival. The South African development experience illustrates not only the corporate capture of the state, but also the corruption of the most powerful sectors of society.

In summary, this study of South Africa illustrates a number of key points which are important to the political economy of global warming in that country but which also act as guides for helping to build the theoretical framework which is then developed in Part III of the thesis.

Firstly, South African institutions are deeply committed to the process of capital accumulation, expressed through continuing to grow and expand both the economy and the coal and coal-fuelled electricity energy sector, despite the costs to the people, the environment, the negative effects on global warming adaptation and the incontrovertible growth in carbon emissions. The chapter

⁶⁰ South Africa used to grow approximately 40% cent of its food; it now produces about 25% (Small 2010).

illustrates that the post-apartheid governments of South Africa have continued the pre-independence capitalist model of development which has further entrenched the (still largely racialised) class divisions of society.

Second, the financialisation of the globalised economy and the internationalisation of South African corporate activity have exacerbated both class divisions experienced as wealth and power differences, and the rift between society and the ecology, as the rush for mining coal and other minerals continues and the profits from such activities leave the country.

Third, international institutions such as the World Bank play a pivotal role in the endorsement of this political economy. The World Bank Medupi Power Plant loan is a global linking of elites and commonalities in their interests in the accumulation of capital.

Fourth, the South African study has illustrated how the coal and electricity sectors are integral to the sub-imperial expansion of capitalism throughout sub-Saharan Africa. Further, it has shown that the coal sector is central to the process of accumulation by dispossession: the dispossession of communities from their land, and the equally insidious dispossession of people from their livelihoods and health through the poisoning of the land, the water and the air. The Medupi Power Plant - with its World Bank loan, its projected emissions, its *raison d'être* being cheap power for multinational conglomerates, its corrupt links to the ANC elite, its need for yet more coal mines – is a metaphor for the anti-social, anti-ecological contradictions of neoliberal capitalism in South Africa.

Fifth, the particular social relations of production unique to mining sites around the world and especially in Third World countries where labour is cheap, expendable and inadequately protected – necessary conditions for accumulation and multinational investments – have been causally linked to health problems such as tuberculosis and silicosis. The use of migrant and internal cheap labour, dislocated from their families and communities, have contributed to the HIV/AIDS epidemic. This is the ultimate exploitation and

alienation when people lose their health and lives due to the particular social relations of production, while the political elite seeks to keep up the facade that the latter is designed for their upliftment from poverty. At the same time the marketisation of the economy within South Africa and beyond, including land grabs and the industrialisation of farming, transforms increasing numbers of rural small holders into the proletarianised unemployed without a future – again destroying people, communities and the ecology.

Sixth, the model of development has not only further impoverished the poor but widened and deepened the gap between rich and poor. It is continuing to undermine the health of the broad ecology that the poor depend on, and will increasingly depend upon, for their survival. Related to this, the IPCC has stressed the importance of good governance and infrastructure, equity, sustainable economic development and carbon emissions reductions as essential ingredients to cope with a global warming world. South Africa is undermining and destroying these vitally important environmental and social lifelines for the future. If one throws into this mix a growing refugee population, internal racial tensions and xenophobia, declining food and water security, an extraordinary lack of moral leadership and political will to find a better way - and global warming – then the future of South Africa looks bleak.

Seventh, the study illustrated another bi-product of neoliberal capitalism where the predominant value is money and the market. It has shown how the incubators of power, greed and corruption have destroyed the integrity of the ANC and contributed to the skewing of the economy toward sectors which make money for some and where corruption greases political policies and political careers.

Finally, while there are manifold demonstrations against the poor conditions under which people live, civil society is the one sector in South African society which is consistently opposing this form of development. The uprisings in Northern Africa and the Middle East since January/early February 2011 are beacons of hope and inspiration for oppressed people on the continent. The factor of global warming however leaves only a small historically specific and

short window of opportunity for change. Otherwise for this country, in five to ten years, the political, economic, social and ecological prospects are grim, as the impacts of global warming are more dramatically manifested. At such a point, it will become increasingly difficult and perhaps too late to carry out any sort of peaceful, transformative structural change.

From this thesis, the particular significance of South Africa – a country which cannot be divorced from the wider African continent context – is that it is a microcosm of the global political economy. It shows the importance of first history to understanding global warming and to finding solutions to global warming; and second, the capitalist development model with its inexorable dependence on fossil fuels and relentless pursuit of growth and expansion in complete contradiction to the requirements of the biosphere and humanity. South Africa exhibits the consequences of a state dominated by the interests of conglomerate capital, with all the resulting aspects of the deepening rift between humans and the environment. It exposes the commonalities of interests of global elites, the merging of corporate and state interests and the significance of power and hegemony in preventing the development of metabolically restorative and harmonious communities. It demonstrates the distinctive, hegemonic and dangerous power of corporations to society.

I have argued that South Africa is a microcosm of the global economy. It is, however, one country which will feel the terrible impacts of global warming very profoundly, given predictions that, with business as usual and a 4°C temperature increase by the end of this century, the capacity of the planet to support humans is likely to be less than one billion, the loss being exponential, bunched toward the end of the century (Spratt 2011) and most severely and foremost impacting Africans. This will mark an unprecedented shock for African and South African societies, bringing both to the point of fracture and chaos at a time of growing global fracture.

This chapter has provided some empirical evidence of the socially and ecologically destructive forces of neoliberal capitalism in South Africa, particularly in relation to global warming. The next section, Part III, turns to

the theoretical underpinnings of the political economy of global warming, drawing heavily on Marxist theory. It provides a theoretical understanding to many of the contradictions raised in the empirical section, bringing to the fore issues of class, power, inequality, alienation, financialisation, the rift between humans and nature, and ecological destruction.

Beyond these issues, as indicated, I have used the analysis of South Africa to help me to develop the theoretical framework for the thesis. The key points that have emerged in this context are the relationships and roles of the state, the market and corporate sectors; power, class and capital accumulation; the financialisation of the economy; the centrality of fossil fuels; and the deep divisions between who benefits and who carries the burdens of the capitalist political economic system. These form the bases of the development of my theoretical framework in Part III. That process and the springboard of the South African study have generated a theoretical structure and content that I do not think would have arisen in any other way. It is not that this South African study has ‘dictated’ the theory of Part III, but it has influenced key aspects of it. This Part II, given its content and focus, was never expected to be determinative of the theory, but it did assist in allowing me not only to make that theory much broader in focus (that is, broader than ‘simply’ the political economy of global warming); but also to present both Parts III and IV of the thesis in terms which are more immediately germane to the problems of, and the solutions to, global warming.

PART III A THEORETICAL FRAMEWORK

Western positivist social and political theory and discourse promote the ideas of liberal democracy and market freedoms as being the goals of development. By so doing this tends to devalue the non-Western 'other', as undemocratic, primitive or perhaps even barbarous. However, 21st century South African (and African) society is permeated with the impact of colonialism and the globalised political economy of capitalism. It is on this permeation of capital accumulation and dispossession in the post colonial period of the Cold War, the Structural Adjustment Programmes and the pan-African institutions such as NEPAD, that Marxist theory sheds critical analytical light on the crises of capitalism and the conjoined growing crisis of global warming.

There is some credence in what Chabal (2009) writes, that there can be no one political theory of Africa since the continent is faced with a wide diversity of cultures and economies. While this is true, and this thesis finds its moral purpose lies with that vast majority of people whose struggle for dignity and sufficiency takes place against unrelenting and deepening hardships, African countries, since the earliest days of colonialism, have been increasingly drawn into the global political economy structures of capitalism, and it is at this level that this thesis is pitched. Political economy is concerned with power and economic structures, the social relations of production and class divisions. This thesis argues that there is validity in using a Marxist approach due to the history of colonialism and dispossession in Africa. It is also concerned with the division, the rift, between humans and the ecology as a result of the capitalist relations of production, relations I will show in this part, that are central to the problem of global warming. So while acknowledging Africa is a continent which gave rise to a richness and diversity in cultures, epistemologies, economies and theories, the focus of the thesis is restricted to the problems created by the globalised capitalist system as represented in South Africa.

This theoretical framework in turn leads into Part IV which proposes principles for an alternative world in the light of the South African study and the desire to see what needs to be done to promote societies that may yet serve to save the planet.

The study of South Africa revealed some of the historical, material, political and economic phenomena which are leading to irreparable damage of the biosphere. It illustrated a number of problems which are deeply engrained in the capitalist fabric which I want to explore further through the lenses of Marxist political economy theory. The centuries of environmental degradation and human dispossession and displacement, that have occurred as part of the process of global capital accumulation through to today, now constitute a rift so deep it may become fatal, taking the Earth's system beyond the stable geological interglacial period in which human civilisation developed. At the same time the thesis has argued that global warming is but one of a number of crises of capitalism.

A starting point for summarising the issue of global warming is the voice of those we seldom hear in the West and is found in the communiqué from the World Social Forum (2009: np) in Belém, Brazil which passionately expresses the divide between the rich who continue to contribute to global warming, and the poor, who are already paying the price.

For us, the struggles for climate justice and social justice are one and the same. It is the struggle for territories, land, forests and water, for agrarian and urban reform, food and energy sovereignty, for women's and workers' rights. It is the fight for equality and justice for indigenous peoples, for peoples of the global South, for the redistribution of wealth and for the recognition of the historical ecological debt owed by the North.

At the same World Social Forum, a Declaration of the Assembly of Social Movements continued in this vein:

The international capitalist crisis manifests itself as detrimental to

humankind in various ways: it affects food, finance, the economy, climate, energy, population migration and civilisation itself, as there is also a crisis in international order and political structures.

Chapter 9 deals with central systemic Marxist issues which relate most directly to global warming, such as the metabolic rift, capital accumulation and financialisation. Translating the lessons from Part II into a theoretical structure in this part, they thus emerge as being based, to a considerable degree, but not wholly, on Marxism: the metabolic rift and specifically the carbon rift and its historical, material and social roots; alienation, of humans from the broad ecology; capital accumulation; and the financialisation of capital. These conceptual areas, though selective, contain within them sufficient scope for an understanding of the basis of global warming and the related and various crises of capitalism. The thesis does not set out to provide a comprehensive theoretical critique of capitalism but attempts to bring a deeper understanding to the structural and historical material systemic characteristics which prevent capitalism from providing a sustainable model of human development. Chapter 10 looks at questions of power, related to the state, corporations and financialisation, but still from a theoretical stance, and includes some concluding comments on what amounts to a criticism of capitalism in the specific context of global warming.

CHAPTER 9 Marx, the metabolic rift and global warming

9.1 Introduction

While recognising the importance of the diversity of epistemologies to the future of humanity, in this chapter I will draw on particular aspects of a Marxist theoretical framework to shed critical light on the historical, structural and systemic causes of global warming. This framework enables me to break through ‘established reality’ (Marcuse 1964: 80). Additionally, as Marcuse (1967: np) argues for the rich in western society ‘it appears crazy at first to want a revolution for we have whatever we want’. But we need tools ‘to transform the will itself so that people no longer want what they now want’ (Marcuse 1964: 80). In considering the pathology of denialism inherent in neoliberal ideology with respect to global warming, where there is a preference to save capitalism over saving the planet, this is a big task. Marcuse was writing over 40 years ago when he almost certainly would not have been thinking of global warming but his comments echo the need today to ‘transform the will’ and create a conceptual framework that gives us hope that there are alternatives to the capitalist system.

Relevant here is Fisher’s (2009: 7) observation: ‘we are inevitably reminded of the phrase attributed to Fredric Jameson and Slavoj Žižek, that it is easier to imagine the end of the world than the end of capitalism. That slogan captures precisely what I mean by ‘capitalist realism’: the widespread sense that not only is capitalism the only viable political and economic system, but also that it is now impossible even to imagine a coherent alternative to it’. Fisher is right in his slogan, but perhaps too dark in his conclusion, as I hope to show in Part IV.

This chapter looks more closely at selected key concepts relevant to global warming from a Marxist perspective, drawing in particular but not solely, from the lessons gleaned from the study of South Africa in Part II of this thesis. These were set out in summary form at the end of chapter 8. It was going through that study of South Africa – that microcosm of the global economy to

use Amin's (Amin 1997) expression again – that I became convinced of four things: first that global warming must be seen not as an isolated problem but one of a series of problems with a common cause; second that that common cause is capitalism; third that critical theory and, in particular, various aspects of Marxist theory can provide the base for my theoretical discourse; and finally that the denialism so prevalent in the politics of global warming is a function of (1) isolating global warming as a problem; (2) not recognising capitalism as the root of the problem; and (3) sticking to positivist analysis and frameworks.

Fortunately there is an accessible and growing body of literature on Marxism and ecology relevant to this part of the thesis.

In viewing that literature, there are a number of major contributions published in the last decade which together provide a rich theoretical resource for understanding the political economy of global warming, as well as other related global ecological crises, poverty and inequality. In seeking to bridge the gap between ecological economists and Marxists, Paul Burkett's books, *Marx and Nature: a Red and Green Perspective* (1999) and *Marxism and Ecological Economics: Toward a Red and Green Political Economy* (2006) take a multidisciplinary approach. Burkett reconstructs Marx's approach to nature, society and environmental crises through a comprehensive and clear exposition of the societal relations of humanity to nature. He demonstrates that Marx's over-riding concern with human emancipation impels him to approach nature from the standpoint of materialist history, sociology and political economy. Marx's concerns, Burkett argues, are compatible with current ecological theory which questions the ability of monetary and market-based values to represent adequately the natural conditions of human production and development. The principle message of Burkett's 2006 book is that capitalism is experiencing not only a crisis of capital accumulation (2006: 171) but also a second, related crisis, 'the crisis in the quality of natural wealth (that is, the environment) as a condition of human development' (2006: 172). These two entwined crises he sees as giving rise to two struggles: the struggle for higher wages, better work conditions and more co-operative and democratic forms of ownership and management (2006:139); and the struggle to reduce alienation for the purpose

of realising 'sustainable human development' (2006: 135). Furthermore, Burkett, unlike many ecological economists, emphasises the centrality of the class struggle, the social separation of the direct producers from necessary conditions of production (2006: 309) as the basis for the development of a truly radical ecological economics, which in turn feeds discussion below of alienation.

Foster is another theorist who has extensively explored the Marxist perspective on ecology. Both his *Marx's Ecology* (2000) and *Ecology against Capitalism* (2002) make specific reference to global warming. Foster (2000: 9) writes that: '[f]rom the start, Marx's notion of the alienation of human labour was connected to an understanding of the alienation of human beings from nature [a] twofold alienation which needed to be explained *historically*' and grounded in an understanding of the material relations of society. Here we are taken back to Marx's 'metabolic relations' between humans and the environment. This is not, as Foster (2000: 11) points out, a simple dualism of eco-centrism versus anthropocentrism, which is a perspective which Foster attributes to much contemporary Green theory. It is based in the class struggle.

Foster and Clark (2009) show how Marx, in *Capital*, articulated the idea that capitalism degrades the environment in a way that disproportionately affects the poor. The scale of ecological destruction in Marx's time was of a different and diminished order from today, but the principles and practice of economic imperialism and its impacts on the ecology continue to the present time.

Foster (2002) raises issues on both global warming and global warming solutions that are relevant to this thesis. These include whether technology is the answer. Foster suggests that, while technological change can 'lower environmental impact' by reducing 'the materials and energy used per unit of output' and substituting 'less harmful technology' (Foster 2002: 92), with respect to the energy efficiency part of technical solutions 'the materials used and the production technology are much more intractable problems under the current regime of accumulation' (Foster, 2002: 93). For example, in the extraction and mining of rare earths, elements, such as dysprosium and

terbium, can cause destruction of land used for food production because of the toxicity of the production process. China currently meets 95 per cent of the world's demand for rare earths (AFP 2011). It is small farmers who have been displaced by this mining, for example, in Batou in northern China. Burkett (2009: 170) also visits this issue, arguing that such solutions as recycling and waste management, environmental restoration of forests, strip mined lands and plundered maritime eco-systems, become ecologically impoverished constitutive parts of the problem, requiring a fresh expenditure of energy and materials rather than being ecologically restorative. More fundamentally, the idea of the possibility of dematerialising economic production, as proposed by many in the field of sustainability and mainstream economics, is discounted by Foster *et al.* (2010: 43) who argue that 'such technological fantasies have no basis in reality'. The idea that capitalism can exist without consuming the planet's materials is untenable.

Drawing on the work of Foster (1999, 2000), Clark and York (2005, 2008) and Foster *et al.* (2010), I now turn to the metabolic rift. This concept has become centre stage in the Marxist ecological literature. As is apparent from the study of South Africa, even if it was not formally identified as such, it is also central to this thesis.

9.2 The metabolic and carbon rifts

The concept of the metabolic rift is at the core of Marx's ecological critique of capitalism. It has recently re-emerged as critical when set in tandem with the various global ecological crises of the late twentieth/ early twenty-first centuries, including global warming. The idea of the metabolic rift (and in turn the carbon rift – see section 9.3) has very direct relevance to global warming.

Foster *et al.* (2010: 7) state that the 'ecological rift' refers to the 'rift between humanity and nature, a product of artificial divisions within humanity, alienating us from the material-natural conditions of our existence'. The metabolic rift provides the conceptual framework for understanding the very basis of the break in humans' relationship with the environment, through

humans' labour in producing livelihoods within the capitalist system. Marx wrote (1976: 283) '[l]abour is, first of all, a process between man and nature, a process by which man, through his own actions, mediates, regulates and controls the metabolism between himself and nature'. With the introduction of the capitalist system of production, this close relationship between humans and nature was broken.

The metabolic rift thus refers to a rupture in the metabolism of the ecological system. The concept is built around how the logic of accumulation severs basic processes of natural reproduction, leading to the deterioration of the environment and ecological sustainability and disrupting the basic operations of nature. It neatly captures the lack of balance between 'expenditure and income' in the Earth's metabolism under the capitalist system. In theorising on this, Marx goes to the very basis of society, how humans interact with the environment, socially and materially, to provide their means of survival. It is from this most fundamental relationship that the ecological contradictions inherent in the very specific mode of production found in the capitalist system, the foundation for the growing disequilibrium in the biosphere and the pending demise of human life, are to be found.

With respect to this balance between expenditure and income, it is to be noted that many economists seem to have lost their way especially when we look back to what the eminent economist Hicks was saying more than 70 years ago. Hicks (1939: np) triggered a debate on sustainability when he defined income as 'the maximum value which a man can consume during a week and still expect to be as well-off at the end of the week as at the beginning'. He argued similarly, at a national level, that wealth was what can be consumed while maintaining a constant level of national wealth. These Hicksian ideas represent the basis of what became ecological economics.

Marx maintained that capitalism generated an unhealthy circulation of matter from urban industry and industrial agriculture which damaged the reproductive capabilities of both human labour power and the land (Marx, 1954 *Capital* Vol 1). Whereas Marx saw that humans' pre-industrial interaction with nature

enabled harmonious and sustainable production, capitalism was not able to maintain the social relations (Marx, 1954 *Capital* Vol 1: 533) or the conditions for the recycling of nutrients back to the soil. Thus was born the metabolic rift.

Marx built on the work of German chemist, Justus von Liebig, who published ground-breaking work in the middle of the 19th century on the consequences of intensive farming practices which were being introduced at that time in the transition from feudal to industrial farming. Liebig, in a pioneering work *Organic Chemistry in its Application to Agriculture and Physiology*, argued that British high farming methods were a 'robbery system', which were opposed to rational agriculture (Liebig 1862, quoted in Foster, 2002a). The new farming methods involved the transportation of food and fibre over long distances from country to city, breaking the natural and restorative recycling of nutrients such as phosphorous, nitrogen and potassium and which instead ended up in urban pollution in the form of human and animal wastes. Liebig saw this as part of a larger scale process in which, under imperialism, the soil of whole countries was robbed for the benefit of Britain. He argued, for example, that England was able to maintain its industrialised capitalist agriculture by importing guano (bird droppings) from Peru. However, even with the imported fertilisers, the soil condition and productivity declined, leading to the need for increasing the size of landholdings and the concentration of agriculture among smaller numbers of proprietors. The cycle of restoring to the land what was taken from it was broken. Liebig argued that rural areas were in essence exporting the fertility of their land.

The metabolic rift is today nowhere more evident than in the closely linked areas of global warming and food security. While the study of South Africa did not reflect the issue of food security, the African continent as a whole illustrates the growing problem of declining food production as a result of global warming. With respect to food security, there is hugely unequal access to food. There are also the growing control of food by mega corporations which dominate the agri-food complex, the super exploitation of labour involved in food growing, picking and processing, the elongated transport routes for food delivery, the de-peasantisation and the trans-border land grabs

that are now taking place for food and biofuel production and the huge levels of food wastage (Rajca 2010)⁶¹ and, as Marx saw from Liebig's work, the destruction of soil fertility. Today, we may have irretrievably tipped the balance in terms of soil fertility and the ability of soil to continue producing adequate food for the global population, with some 75 millions of tons of top soil lost annually globally with more than 80 per cent of the world's farming land affected.

Marx was working on *Capital* Vol 1 when he came across Liebig's work and was greatly influenced by it, writing to Engels that '[t]o have developed from the point of view of natural science the negative, that is, destructive side of modern agriculture [was] one of Liebig's immortal merits' (Marx, quoted in Foster 2002a). Marx wrote on the transformation of agriculture in the 19th century, that the capital accumulation process disrupts the natural processes and cycles and leads to the systematic degradation of the environment. Marx (*Capital* Vol 3, 1970: 949-50) stated:

all progress in capitalist agriculture is a progress not only of robbing the worker, but of robbing the soil; all progress in increasing the fertility of the soil for a given time is a progress toward ruining the more long-lasting sources of that fertility. Capitalist production, therefore, only develops the technique and the degree of combination of the social process of production by simultaneously undermining the original sources of all wealth – the soil and the worker.

Marx, however, developed the concept of the metabolic rift further. In fact he has two meanings for the term metabolism. One refers to the regulatory processes that govern the complex interchange between humans and nature, specifically with regard to nutrient cycles. The second holds a wider, social meaning, describing the institutional norms governing the division of labour and distribution of wealth. It is metabolism as moral economy. In this, Marx both anticipates and attributes environmental crises to the division of workers

⁶¹ In Australia each year alone, it is estimated about 4.45 million tonnes of food, worth \$7.8 billion, is discarded. www.newsstore.fairfax.com.au/.../browseArchive.ac?

into classes and, in particular, their separation from the land as well as from the other conditions of production, explicitly linking these with social issues in the analyses of environmental concerns. The concept of the metabolic rift embraces both these meanings.

Thus metabolism is used by Marx to refer to the complex, interdependent, social and dynamic interchange between human beings and nature. This enabled Marx to express the idea of alienation in two forms: alienation of humans from nature; and, in relation to the productive process, the alienation of labour. As Marx writes, in *Grundrisse* (1971: 489):

It is not the *unity* of living and active humanity with the natural, inorganic conditions of their metabolic exchange with nature, and hence their appropriation of nature, which requires explanation, or is the result of a historic process, but rather the *separation* between these inorganic conditions of human existence and this active existence, a separation which is completely posited only in the relation of wage labour and capital.

Foster (2008) takes us back a step to the historical beginnings of capitalism, that is, the transition from feudalism, a process which occurred over centuries, to understand the metabolic rift more fully. In this transition process, the bourgeoisie developed from the feudal economy, with the transformation of the feudal mode of production to the capitalist social relations of production to form the capitalist system. This in turn changed the relationship of the workers to the land, replacing what had been a direct relationship in the agrarian feudal system between labour and rights to the commons and access to feudal lords' lands to grow supplementary food.

Through the expropriation of the commons during the enclosure movement of the 15th to 18th centuries (in Britain), formerly agrarian workers were dispossessed of commons land for the production of food, or access to feudal lands for the same, and forced to move to towns, with nothing to sell but their labour for their sustenance, causing not only the robbing of the soil, but also

the exploitation of the worker and the establishment of capitalist class relations. Marx (1954: 504) writes:

In the sphere of agriculture, modern industry has a more revolutionary effect than elsewhere, for this reason, that it annihilates the peasant, that bulwark of the old society, and replaces him by the wage-labourer. Capitalist production completely tears asunder the old bond of union which held together agriculture and manufacture in their infancy. Capitalist production, by collecting the population in great centres, and causing an ever increasing preponderance of town population, on the other hand concentrates the historical motive power of society; on the other hand, it disturbs the circulation of matter between man and the soil, i.e., it prevents the return to the soil of its elements consumed by man in the form of food and clothing; it therefore violates the conditions necessary to lasting fertility of the soil. By this action, it destroys at the same time the health of the town labourer and the intellectual life of the rural labourer.

Marx wrote furthermore of the agricultural labouring population being a surplus that is constantly at the point of becoming the urban proletariat, reduced to the minimum of wages and ‘always stand[ing] with one foot already in the swamp of pauperism’ (Marx 1954: 642).

As was shown in the South African study, this process of ‘annihilating the peasant’ continues today where capitalist development, including industrial agriculture in the form of agribusiness and land grabs for food export and biofuel production, are growing, with the displacement of the Indigenous peasant and subsistence farmers and accompanied by the destruction of not only local economies and cultures, but also the environment at the periphery of the global economy.

The industrialisation of agriculture and the displacement of small scale producers from the land has a particular significance and momentum today in terms of food security, burgeoning unemployment and the corresponding explosion in urban slum dweller populations. Foster et al (2011) discuss this destruction of the peasantry and the weakening position of labour as a part of the new 21st century imperialism. They argue that this destruction of the peasantry is amongst the numerous forces impacting

on the material basis by which multinational capital weakens labour. For example, Foster et al (2011: 2) write that the ‘vast “internal reserve army” within the developed capitalist countries, constituted the real material basis on which multinational capital was able to internationalize production - creating a continual movement of surplus population into the labour force, and weakening labour globally through a process of “divide and rule”.’ This process is compounded through financialisation, the internalization of monopoly capital, the global concentration and centralisation of production, and the polarization of wages - the ‘race to the bottom’ - all of which are linked through the global reserve army of labour (Foster et al 2011). This process is compounded by the huge numbers of unemployed in the third world being expanded significantly in recent decades by ‘the de-peasantisation of a large portion of the global periphery by means of agribusiness - removing peasants from the land, with the resulting expansion of the population of urban slums’ (Foster et al 2011: 3). Foster et al (2011: 3) continue that between 1980 and 2007, this labour force grew from ‘1.9 billion to 3.1 billion ... with 73 per cent of [it] ... located in the developing world’.

Amin (quoted in Foster et al 2011: 22) argued that ‘modern capitalist agriculture, encompassing both rich, large scale family farming and agribusiness corporations - is now engaged in a massive attack on third world peasant production’ displacing world-wide in excess of 3 billion rural workers by twenty million new modern farmers. This is the model of development supported by global institutions such as the WTO, the World Bank, and the IMF.

The dominant ideology maintains, however, that the displaced rural workers and peasants will be absorbed by industry in urban centres as, it is falsely maintained, supposedly happened in the history of the developed capitalist countries. However, the reality for European countries during the ‘depeasantisation’ and industrialisation periods is that many millions of surplus populations were transported or emigrated to other parts of the planet - a phenomenon which is not possible today. Foster et al (2011:22) argue that the current de-peasantisation process is equivalent to ‘mass genocide’, given that no amount of economic growth can possibly absorb the billions of peasants in the world today into employment. Already, there are 3 billion plus people concentrated in massive cities and slums in the South - the ‘dumping

grounds' for surplus population (Foster et al 2011: 23). The end result of this phase of imperialism is that 'the share of wages in total world output decreases, while the rate of exploitation worldwide rises' (italics and quote from Foster et al 2011: 24). This phenomenon characterises neoliberal development throughout Africa and South Africa and was discussed in Part II of the thesis in both the African context and within South Africa, with South Africa both experiencing and perpetrating this development model. Part IV of the thesis draws on the principles and experiences of movements such as via Campesina, or small scale farmers, as an alternative model of social relations which challenges the neoliberal, large scale capitalist model of development.

For a global warming world, this phenomenon of de-peasantisation will be catastrophic, as the process of de-peasantisation goes hand in hand with the growing slum/urbanisation of both the South African and African population and with growing numbers of feet in the increasingly inescapable 'swamp of pauperism'.

Returning to the historical beginnings of this process, the transformation from feudalism to capitalism also meant a transformation from the direct connection of labour to land in producing livelihoods, thus tearing asunder the close and intimate connection between labour, land and livelihood and laying the foundation for human alienation. It is here that the social aspect of the metabolic rift is found. The labour process is one in which humans interact with nature to produce their livelihoods. Labour is the key to this wealth. The use value of labour in the production process is nothing else than the result of the transformation of matter and energy, that is, the transformation of nature. This is the core of the human-nature metabolism and it is the disruption of this link which gives rise to the second sense of the metabolic rift, the disjuncture in relations between humans and the environment, due to the social relations of production within the capitalist system, specifically, the division between labour and capital, and the alienations to which this gives rise.

Much of the labour from the land became the labour for the factories in the newly industrialising societies. Marx both anticipates and attributes environmental crises to the separation of workers from the land and their

subsequent division into classes. He thus explicitly linked materialist and social issues in the analysis of environmental concerns. While the industrial revolution began in Britain, the effects spread, both in the industrial mode of production and the accompanying social relations of production. Through colonialism and imperialism and the insatiable appetite for resources by the industrial centres, the peripheral states in turn were robbed of their resources, the people dispossessed of their lands, enslaved, impoverished or exterminated. Thus was born the metabolic rift on a global scale, and the foundation of the ecological debt the North owes to the South, the rich to the poor.

Marx's exposure and analysis of the metabolic rift associated with capitalist industrialisation is taken further when he analyses the origins of agricultural land rent in *Capital* Vol 3, (1981: 949), arguing that:

Large landed property reduces the agricultural population to an ever decreasing minimum and confronts it with an ever growing industrial population crammed together in large towns: in this way it produces conditions that provoke an irreparable rift in the interdependent process of social metabolism, a metabolism prescribed by the natural laws of life itself. The result of this is a squandering of the vitality of the soil, which is carried by trade far beyond the bounds of a single country.

The need for larger tracts of land for agricultural production meant the superfluous labour also had to move off small land holdings which merged into larger holdings. In turn they had to move to the towns compounding the problems of the division of labour, the separation of humans from nature and the alienation of humans from directly producing their food and fibre and being transformed into alienated labour. As alienated labour, workers began working for exchange value rather than use value. Exchange value becomes increasingly important, driving yet further the material processes of production, the elevation of the market and money as the predominant social institutions, and hence the expansion of capitalism and, its converse, the decline of communities, the commons and the environment. Thus, the metabolic rift, caused by the taking of food and fibre from the countryside to the town, was

exacerbated by the building in of yet further rifts including the second aspect of the metabolic rift, which for Marx was inextricably linked to the labour process. This was illustrated in the South African study, particularly in the work of van Olselen (1996), in writing of the life and times of Kas Maine in *The Seed is Mine*.

Foster (2008: np) writes that this capitalist system worked because of the incessant process of accumulation. This then resulted in 'ever more divided, more alienated human beings, together with a globally destructive metabolism between humanity and nature'. The conquest of nature became also the conquest of man. He continues:

this dialectic of domination and destruction is now spiralling out of control on a planetary scale. Economically, overall inequality between the centre and periphery nations of the world system is increasing together with the intensification of class inequality within each capitalist state. Ecologically, the world's climate and the life-support systems of the entire earth are being transformed by a process of runaway global warming (Foster 2008: np).

The rift, or breaking of this human-nature metabolism that is found in the disruption of the cycle of soil – nutrients – produce – consumption – waste – soil, is found again in the carbon cycle. It is to the carbon cycle and the accumulation of carbon dioxide in the atmosphere as a result of burning fossil fuels⁶², the process which provides the energy for the expansion of capitalism and which gives rise to a specific form of the rift in the Earth's carbon metabolism that I now turn.

The carbon rift refers to the accumulation of carbon dioxide in the atmosphere as a result of human activities, to the point that the Earth's 'self regulation

⁶² The burning of fossil fuels is the predominant, but not only activity which released carbon dioxide into the atmosphere. Other activities, such as industrial agriculture (excluding the use of fossil fuel energy) for example, does also, but for the purposes of simplicity of understanding, I am referring only to fossil fuels here to make a point.

upon which all life depends will be put at risk' (Lovelock 2006: xv), not only damaging the environment but specifically causing global warming.

The extent and consequences of this accumulation of carbon dioxide in the atmosphere were covered earlier, in Part I of the thesis. The relationship between the metabolic rift and the global political economy system was outlined in 9.2 above, showing how capitalism systematically destroyed the social and biological basis for sustainability on an increasingly globalised scale. The carbon rift is just one aspect of the metabolic rift, but the one most pertinent to the political economy of global warming.

Foster *et al.* (2010: 126-131) provide a comprehensive summary of the geological and evolutionary history and physical structure of the biosphere's carbon cycle, including how carbon was stored through geological processes as concentrated (and stable) energy in the form of fossil fuels. To reiterate. These processes effectively removed large quantities of carbon from the biosphere, making the biosphere eventually conducive to the evolution of humans and other species. The carbon cycle continues to involve the whole biosphere with carbon moving through air, water, soil, all living things, the oceans and so on, in a cyclical process. The various components of the carbon cycle contribute to the complex relationships of exchange and regulation of carbon throughout the biosphere. The global carbon cycle involves both the geological cycle, which operates over millions of years, and the biological/physical cycle which is observable as a continuous process, operating at shorter time scales (minutes to thousands of years). It is the changes to the geological cycle which is experienced as Anthropogenic global warming. For the past 400,000 years, the climate system and the carbon cycle have operated in a manner that has sustained an even temperature on the planet suitable for humans and other species. As outlined earlier, the concentration of carbon dioxide (and other gases) in the atmosphere has increased significantly, the balance which had prevailed is now out of kilter and the climate system is changing. This constitutes the carbon rift. If this is not restored in the very near future, in less than 10 years, it will deepen inexorably, setting in motion an irreversible process of change to the biosphere that is out of the control of humans.

As the economic system expands, the use of material and energy also increases, with nature providing free gifts to the owners of capital, free gifts which are not taken into account in capitalism's accounting. Foster *et al.* (2010: 137-8) argue that

[c]apital cannot operate under conditions that require the reinvestment of capital into the maintenance of nature. Short term profits provide the immediate pulse of capitalism. Capital itself is a manifestation of completion in the accumulation of wealth. Money serves as a universal measure and means for international trade and aids capital in its international expansion, as it incorporates more people and nature into the global system. The monetary process comes to dominate the organisation of the material processes of production. In this, capitalism conquers the earth (including the atmosphere), taking its destructive field of operation to the planetary level. The exploitation of nature is universalized, increasingly bringing all of nature within the sphere of the economy, subjecting it to the rationality of profitability.

This is perhaps too bold from Foster *et al.* as some economists (see for example Hicks 1939 and Dasgupta 2010) have sought to take these 'free gifts' into the economic equation. Such economists remain a small minority.

Herein lies the key to global warming, its cause and, from an understanding of this, the beginnings of a possible solution *if* the rift has not become irretrievably severed.

Thus, Marx, in building on the work of Liebig, developed a theory of capitalism that has given rise to this schism between humans and nature. The consequences of this analysis are clear: these rifts, the metabolic and the carbon, cannot be resolved by mechanical solutions, such as carbon trading, carbon taxes, geo-sequestration and renewable energy. There must be social solutions. There must be a different economic structure. The metabolic restoration of the environment can only be fully achieved *outside* of the capitalist relations of production. For the solution, it is to a new political

economy that we need to look to rebuild the harmonious, cyclical relationship between humans both as part of the ecology and as actors upon the ecology, so we can restore the metabolic balance, including the balance in the carbon cycle and the balance in the social relations of production. Hence, if irreversible tipping points have not been passed, it is possible for society to achieve a systematic restoration of its reproductive metabolism with the land ‘in a form adequate to the full development of the human race’ (Marx *Capital* Vol 1, 638, quoted by Burkett and Foster 2006: 142). I will pursue this possibility in Chapter 11.

In continuing the critique of capitalist political economy, I will now turn more specifically to one of the consequences of the metabolic rift – that of alienation - which helps to reveal some of the inabilities of societies to address the various contemporary ecological crises and to continue consuming endlessly, despite human societies being on the precipice of their extinction.

9.3 Alienation

The issue of alienation is important both to the understanding of and for the solution of the problems of global warming and the myriad of other ecological and social problems faced in a capitalist world.

Foster *et al.* (2010:14) write: ‘[t]he planet is now dominated by a technologically potent but alienated humanity, alienated from both nature and itself and hence, ultimately destructive of everything around it. At issue is not just the sustainability of human society, but the diversity of life on Earth’. What I want to suggest is that alienation takes three (and perhaps even four) forms each of which is relevant to the theoretical framework being developed under the central concept of the metabolic rift. First following McClintock (2010) there is a biophysical metabolic relationship. Then there is the metabolic rift which is given birth from the way in which land is commodified and labour and food are no longer at the very heart of social and economic relations. Thirdly there is the individual rift for the worker, the alienation of

people from the products of their labour. There is however in a sense a fourth rift which is the combination all three in a unified metabolic rift.

To give a full account of the complexities of Marx's concept of alienation is a vast task. Fortunately that is not necessary for the purposes of this thesis. What is important is to examine the concept of alienation and its relationship to the metabolic rift and to explain how humans have got to the point of being more concerned with the continuation of current lifestyles and of the capitalist system than with confronting the causes of the several crises, including global warming, that they face.

As indicated, the human-social relationship to nature is central to the metabolic rift and it is at this very point that alienated labour mediates the relationship within the capitalist relations of production. Meszaros' *Marx's Theory of Alienation* (1970) describes the double alienation of humans in the complex relationship between humanity, labour and nature. Marx, and Hegel before him, treat human labour as fundamental and the particular labouring relationship of humans under the capitalist system as the basis of class relations and the source of alienation of humans from one another (as alienated labour) and from nature. The idea of the alienation of labour is critical to the concept of the metabolic rift and stems from Marx's conception of the human condition as being in essence alienated labour under capitalism. Marx's economic analysis of capitalism is based on his version of the labour theory of value, a theory which he shared with earlier classical economists such as Adam Smith (1976), although Marx placed different significance on that theory. Most commonly Marx's labour theory of value is interpreted as meaning that the value of a good is based or is to be based on the socially necessary amount of labour needed to produce it. While there has been much criticism of this interpretation, there are others. Marx's main use of it was to explain the origin and size of profits and the rate of profits in the capitalist mode of production (Harcourt and Kerr 2009). It is of note, however, that Joan Robinson (1972: 38) who was a keen contributor to Marxist thought, argues that 'commodities normally exchange at prices proportional to their *values in this sense* [i.e their labour values]'. She notes that we do not have to test such a proposal because

‘we know in advance, and Marx also knows, that it is not accurate’. What she goes on to suggest (as Sen 1978 asserts she is saying) is ‘that labour has the right to the whole product’. This is the key for Robinson and for this thesis. The problem over the years with Marx’s labour theory of value has been that, by its critics, it is seen purely in technical terms and at that level I would argue that much of the criticism may well be valid. Adopting, however, this deeper, social interpretation of Robinson and in turn Sen, which seems often to be missed by his critics, is a more valid interpretation of Marx’s labour theory of value, at least for the way in which this thesis seeks to use it in the context of alienation and in turn the metabolic rift.

The really central issue here is thus not about the relationship between value and price but rather, going back to Marx’s view of value as ‘a relation between persons expressed as a relation between things’ (Marx 1887 quoted in Sen 1978). This point is amplified by Maurice Dobb (1973: 145):

Such an approach serves also to explain the place assigned [by Marx] to labour as human productive activity: why it is natural for Marx to place it in the very centre of the stage. Implied in this is a virtual definition of productive *activity* in the sense of the annexation or receipt of part of the fruits of production by those who have contributed no productive activity and lack any personal participation in the process of production *per se*. As such ‘exploitation’ is a factual description of a socio-economic relationship.

Braverman (1974: 51) adds emphasis to the human dimension of labour, as seen by Marx: ‘for humans in society, labour power is a special category, separate and inexchangeable with any other, *simply because it is human*’.

Alienation is a historical and systemic problem arising from capitalist social relations. That is, the capitalist social relations of production do not just produce more wealth for the capitalist, but institute a system of domination and exploitation in which the worker is robbed of his/her autonomy, sense of

community and humanity. Marx wrote that in capitalist society, labour was organised in such a way as to make work involuntary for the vast majority of the population. Workers were wage slaves who had to work in order to eat. According to Marx (1963: 125):

The worker feels himself at home only during his leisure time, whereas at work he feels homeless. His work is not voluntary but imposed, forced labour. It is not the satisfaction of a need, but only a means for satisfying other needs. Its alien character is clearly shown by the fact that as soon as there is no physical or other compulsion it is avoided like the plague ... the external character of work for the worker is shown by the fact that it is not his own work but work for someone else, that in work he does not belong to himself but to another person.

This alienated labour results in the degradation of human life in exchange for the things necessary merely to survive. Human beings are thus alienated from their social nature as species beings (Marx 1971). It was the liberation from this alienation that Marx saw as the central historical problem of human existence and it is this historical problem that is now also central to a solution to global warming. As Burkett (2009: 88) writes:

The structural powerlessness of working people *vis-a-vis* the capitalistically developed conditions of production helps explain the limited ability of non-class political and ideological struggles to defend pro-ecological values against the market ... these struggles will remain rearguard actions as long as they do not strive toward a dis-alienation of working people and their communities *vis-a-vis* the main conditions of production. This systemic/structural problem explains why non class political and ideological struggles are unable to 'save the planet' from ecological destruction.

The very lack of political and ideological struggles in the rich industrialised world can also in part be attributed to a new type of alienation of workers, with

the middle class having ‘completely recast even the notion of work as the activity that provides individual motivation, social integration and systemic reproduction ... what has become central is consumer sovereignty and freedom in the market’ (Chachage and Annan-Yao 2004). These are powerfully seductive and alienating phenomena. There would be much consensus that alienation is a pervasive malaise in contemporary society. Indeed while he does not label it as such, Taylor (1991) clearly has this in mind when he writes of the ‘malaise of modernity’. This he describes as ‘the dark side of individualism’ with its ‘centring on the self, which both flattens and narrows our lives, makes them poorer in meaning and less concerned with others or society’ (Taylor 1991: 4).

In addition to the structural aspects of alienation, there are now cultural and technological aspects which compound the original source of class alienation. Human alienation on all levels has a synergistic effect on humans’ ability to tackle issues such as global warming and other ecological problems. Levels of alienation of humans as species beings are compounded by, for example, information technologies, to the point where it was reported that a young Japanese man married his cyber bride (BBC News 2009) and, again, a Korean couple were so addicted to a cyber-game around rearing a child, they failed to feed their real human baby daughter (*Daily Mail Online* 2010).

There is a separation in reality of humans from nature which is deeply flawed and contrary to the pursuit of sustainable living. This alienation is explored by Rutherford (2008) in *The Culture of Capitalism* in which he argues that, under the sustained affluence in the west, there is a powerful trend toward a liberation ethic of self-expression (echoing again Taylor’s ‘malaise of modernity’). Within this culture ‘the ideological weapon of neo-liberalism and the new technologies of information and communication [are] key resources for creating the new regimes of capital accumulation’. He continues: ‘the fastest growing economic sector [in the UK] during the 1990s was the cultural industries – advertising TV and radio, music, publishing, film and video, design, designer fashion and computer and video games [and] indicative of the rise in an experience-oriented consumerism whose ends are aesthetic pleasure

and self-fulfilment' (Rutherford 2008: np). Thus technology and the market are creating new kinds of commons and opportunities for capital to commodify such cultural practices. There is thus a move to what Rutherford (2008: np) calls 'desiring consumers' and the 'economic sphere expands as production conscripts the thinking, imagination and sensibilities of individuals'. He thus argues we have a new kind of capitalism which seeks to enclose new commons - 'the cultural and intellectual commons – the commons of the human mind and body, and the commons of biological life' (Rutherford 2008: np). This culture of capitalism is pervasive, including in our education systems where the cultures of schools and universities have been transformed to meet the needs of the market, where individuals are conditioned to meet market criteria. What is valued and rewarded is the individual's economic potential in the market.

Rutherford's thesis is what I would describe as the colonisation of people by the market and, perhaps even more sinisterly, the colonisation of the minds of the populace, with manifest implications for a deep alienation and disconnection in people's social and ecological relationships. Here there are echoes of the point I made in section 9.1 from Marcuse (1967): that the aim must be 'to transform the will itself so that people no longer want what they now want'. This has potentially major ramifications for human society. This is especially the case in a world in which, if we are going to solve the problems of global warming, poverty and inequality, we require critical thinking, human solidarity and a recognition of our being both a part of and interdependent with the broad ecology and the human community. The liberation from this alienation is critical to the transformative changes needed to solve the problem of global warming, of finding a way to create the level of critical awareness necessary to transform society to one that is sustainable and in which humans live in harmony with the environment. I will return to this problem in Chapters 11 and 12 where, although I do not cover the operational solutions to the change process, I do offer some clear pointers for the future. Meanwhile, I return to criticising further other aspects of the capitalist system which are of immediate relevance to the political economy of global warming and the crises of civilisation.

9.4 Capitalism and capital accumulation

Global warming (and the many other systemic problems) has resulted from more than a problem of capital accumulation. However, the dynamics of capital accumulation are critical to the unsustainability of capitalism, as argued in section 9.2, but also because of the physical consumption of resources and production of wastes. Capital accumulation, euphemistically called economic growth, so central to almost all nation states today, is the ‘elephant in the room’ for proposed solutions to global warming. As the study of South Africa illustrated, capital accumulation imperatives have over-ridden the objectives of employment, equity and sustainability in South Africa and sub-Saharan Africa.

Marx proposed that, if the productivity of labour is such that each person can only produce enough for their subsistence, social divisions do not take place in the society. However, if productivity is increased beyond this subsistence level, the conditions are established for a struggle over how the surplus is shared. Also, with an increase in the productivity of labour, conditions then arise whereby some are freed from having to work for their subsistence. Some of these in turn become the ruling class.

Marx wrote in *Capital Vol.1* (1954: 715) that ‘the economic structure of capitalistic society’ grew out of the decline of ‘the economic structure of feudal society, when the labourer only had his own labour to dispose of after he had ceased to be attached to the soil and ceased to be the slave, serf, or bondman of another’. This was the starting point for the creation of the wage labourer, the defining element of exploitation under capitalism and the capitalist. Within this framework, the exploitation of people goes hand in hand with the exploitation of nature.

It was maintained by Marx that ‘[t]he so-called primitive accumulation is nothing else than the historical process of divorcing the producer from the means of production. It appears as primitive, because it forms the pre-historic stage of capital and of the mode of production corresponding with it’ (Marx

Capital Vol. 1 1954: 714-5). He continued that ‘the labourer, could only dispose of his own person after he had ceased to be attached to the soil and ceased to be the slave, serf, or bondman of another ... these new freedmen became sellers of themselves only after they had been robbed of all their own means of production, and of all the guarantees of existence afforded by the old feudal arrangements [thus giving rise to] the transformation of feudal exploitation into capitalist exploitation’. Marx (*Capital Vol. 1* 1954:716) adds that ‘[i]n the history of primitive accumulation great masses of men are suddenly and forcibly torn from their means of subsistence, and hurled as free and “unattached” proletarians on the labour market. The expropriation of the agricultural producer, of the peasant, from the soil, is the basis of the whole process.’ This is a process which was central to colonialism and continues today in Africa. It is a key aspect of the globalising metabolic rift and human alienation.

The history of the Middle Ages in England shows clearly this transformation from feudal society to capitalist society and the violent process of primitive accumulation. Marx considered the first ‘law of motion’ of the capitalist mode of production to be the compulsion for the capitalists to step up constantly the rate of capital accumulation through the production of new goods, new methods of production and the conquest of new sources of raw materials. The inner logic of capitalism is to work for not only profit but also capital accumulation.⁶³ Capitalists are compelled to act in that way as a result of the need to grow and accumulate or to be taken over by the accumulation processes of others, a process which continues until today. This law of accumulation was amply illustrated in the study of South Africa.

Economic growth is essential to capitalism. It remains not only the cornerstone of neoliberal economic policy and the *raison d’être* of so many governments’ economic policies; it is seen as the only way. The contemporary expression of this imperative for continual accumulation is the equating of the concept of economic growth with that of human and social development. Thus Beckerman

⁶³ Accumulate, accumulate; that is Moses and the Prophets’, states Marx in *Capital Vol. 1*.

(1974: 9, quoted in Fig 2007: 227) states: 'a failure to maintain economic growth means continued poverty, deprivation, disease, squalor, degradation and slavery to soul-destroying toil for countless millions of the world's population'. In reality, however, capitalism is not concerned with the eradication of poverty or deprivation. Capitalists have gone beyond a concern to produce commodities to satisfy basic human needs such as food, shelter and clothing. The use value of commodities has become subordinated to the exchange value for the sake of profit, with the actual use of the goods being produced becoming increasingly immaterial, a problem overcome by advertising and the marketing industry which, in addition to persuading people to buy useless items, convince people that such buying is an essential expression of one's democratic rights and a way of building an identity in today's society.

The violent birth of capitalism was a precursor to the events which occurred during imperialist expansion and colonisation. The 'constant generation of a relative surplus population ... keeps wages low corresponding with the wants of capital'. The labourers' dependence on capital is 'guaranteed in perpetuity by the conditions of production themselves while the bourgeoisie ... uses the power of the state to 'regulate' wages, an essential element of the so-called primitive accumulation' (Marx *Capital Vol 1*, 1954: 737). This relationship of labourers to capital is structural; the power imbalance is evident in the vast supplies of unemployed labour found in slums and the 'informal economies' such as in the townships of South Africa today. There the abundant supply of cheap, exploitable and exploited labour underpins the first world economy of the city centres, the elite and the state institutions relevant to the business sector.

Contemporary Marxist theorists such as Ernest Mandel (1979: 68) have developed the theory of primitive accumulation to include the 'law of combined and uneven development'. This seeks to explain the process involved in the expansion of the capitalist economy on a global scale under imperialism, which has in turn led to the under-development of peripheral countries and regions. Mandel also distinguishes between the primitive

accumulation of money capital and the primitive accumulation of industrial capital, using the example of the enormous capital value to Europe of the slave trade during the sixteenth to mid eighteenth centuries which underwrote the development of industrialising countries. In a similar vein, Harvey (2003) in *The New Imperialism*, develops Marx's concept of primitive accumulation and introduces the term 'accumulation by dispossession'. Harvey argues that this form of accumulation is a continuing process, within capital accumulation on a global scale, and now also includes such dimensions as intellectual property rights and patents. This is particularly important in considering neoliberal solutions to global warming, such as carbon emission trading schemes, which are simply market solutions seeking to justify the privatisation of the atmosphere. This means in turn that the atmosphere becomes another site for capital accumulation.

A part of the balance sheet which is obscured in the capital accumulation process and which intersects with the problem of global warming is the issue of ecological debt. There have been no reparations for the capital flow from non-industrialised to industrialised countries. These flows continue today, as was shown in the case of South Africa. Industrialised countries were built on the flow of raw materials, cheap labour, expropriated land, minerals and agricultural produce from the colonised periphery to the industrialising centre. There can be no solution to global warming without a cessation of this practice and some redress of the historical expropriation and exploitation.

There is a separation in reality of humans from nature which is deeply flawed and contrary to the pursuit of sustainable living. This alienation is explored by Rutherford (2008) in *The Culture of Capitalism* in which he argues that, under the sustained affluence in the west, there is a powerful trend toward a liberation ethic of self-expression (echoing again Taylor's 'malaise of modernity'). Within this culture 'the ideological weapon of neo-liberalism and the new technologies of information and communication [are] key resources for creating the new regimes of capital accumulation'.

For Marx, capitalism and capitalist history are driven (at an abstract level) by contradictory structural relationships based on antagonistic class relations around (over) production and the expropriation of surplus value; by competition between capitals that imposes the need for further competition, accumulation and growth; by the relationship between the forces and relations of production and between relations of production and the land and soil. At the heart of these are class relations which are fundamental in capitalism. They are the social relations of exploitation of one group of people by another. It is this social rift which is at the epicentre of the ecological rift. At the global level, there is certainly a division between North and South, centre and periphery, rich and poor countries. At the very basis of these divisions however is the division of class. Within the globalised economy there is a hierarchy of states, and a regionalisation of economic activities around a dominant state for example in Europe it is Germany; in Asia, Japan but with China rising (Navarro 2007 :19). The US is currently the most dominant state of all, with its position being maintained by class alliances with the dominant classes in other states. As Navarro (2007: 19) argues, '[n]eoliberal ideology provides the linkage among these classes' with the commonality of ruling class interests outweighing the tensions of difference. The ruling classes therefore are transnational; likewise the exploited classes, although the inequalities in the exploited classes are deep and systemically divided and robbed of the opportunities and culture of international solidarity. The strong ideological linkages between the global and (South African) national elites was demonstrated in the example of the World Bank loan to build the new Medupi coal fired power station (see 7.3).

The significance of class to global warming is profound. The incessant drive for growth for the benefit of ruling class-based profits and capital accumulation is directly linked to the exploitation of both labour and land. The exploitation of the land leads to its ruin and the 'externalities' of this imperative push the environment to the brink of being no longer recoverable. Foster *et al.* (2010) argue that the overexploitation of nature's resource taps and waste sinks, under the capitalist system, has reached the point where both are negatively impacted,

firstly at a regional, then at a planetary level, affecting the climate and the biosphere itself. This situation is further evidence for a major conclusion of this thesis: the need for economic regime change.

What is happening in practice is that the imperative for accumulation is gathering momentum and new ways are being found of expanding which bring new forms of alienation and exploitation leading to a deepening of the metabolic rift. One of these new forms of capital accumulation is financialisation, as demonstrated in the study of South Africa. This phenomenon has particular significance for global warming, both directly but also less directly because of the implications it has for proposed carbon reduction strategies such as emissions trading schemes. Let us look at financialisation.

9.5 The financialisation of capital

‘If Marx had one big idea, it was that capitalism was the rule of money which was itself the expression of greed’ (Muller 2002: 191). This rule of money was fundamentally immoral because it deprived the vast majority in a capitalist society of their humanity. This is central, particularly given the shift in the nature of capitalism during the last three decades from the monopoly capital of the real economy, i.e. from the material, tangible goods, services and resources produced and exchanged to monopoly finance capital – what Harvey (2001: 15) refers to as an ‘unprecedented autonomy of money capital from the circuits of material production’. This shift, in the late 20th and early 21st centuries, the era of neoliberalism, was a major factor in the 2008-2009 crisis of capitalism (Foster and Magdoff 2009; Palley 2007) but it also contributes to other ongoing problems: of class differences, the disenchantment with democracy and the more general environmental crisis.

So what is this financialisation of the economy? In short it means the economy has moved toward proportionally greater economic activity in the financial sector rather than in the productive sector, with an increasing role being played

by financial markets and institutions. Palley (2007: 2) describes financialisation as ‘a process whereby financial markets, financial institutions, and financial elites gain greater influence over economic policy and economic outcomes. Financialisation transforms the functioning of economic systems at both the macro and micro levels.’ He argues that it has three main impacts: to ‘(1) elevate the significance of the financial sector relative to the real sector, (2) transfer income from the real sector to the financial sector, and (3) increase income inequality and contribute to wage stagnation’ (Palley 2007: 2).

Epstein (2006: 3) examines a number of definitions of financialisation. The following two are most relevant for this thesis. The first is that by Hilferding, who uses the term to refer to the increasing political and economic power of a particular class grouping - the rentier class (i.e. people who live on income from property or investments). Second the definition by Krippner (2004: 14 quoted in Epstein 2006: 5) states that financialisation is a ‘pattern of accumulation in which profit making occurs increasingly through financial channels rather than through trade and commodity production’. The extent of the momentum of this financialisation is apparent in the figures from the Bank of International Settlements, showing that the ‘daily volume of foreign exchange transactions rose from 570 billion dollars per day in 1989 to 1.9 trillion dollars per day in 2004’ (quoted in Epstein 2006: 4).

Another measure of the move to financialisation is that funds raised on international financial markets as a percentage of world exports rose from 0.5 per cent in 1950 to over 20 per cent in 1996 (Baker *et al.* 1998 quoted in Epstein 2006: 4). Particularly germane to this thesis is that the consequences of this financialisation have been ‘highly detrimental to significant numbers of people around the globe’ (Epstein 2006: 5). It has meant a growth in power of the financial institutions and a consequent decline in power of labour unions, whose links to the economy are through the production process. As the financial sector is separated from both the means and modes of material production, this is a double alienation of labour; first from the environment; and second from the means of production. It has also meant growing inequality, nationally and internationally, an increase in the percentage of

national incomes going to capital (Ruccio 2010), as well as the centralisation and concentration of capital.

Bagchi (2005: 319) writes that '[o]ne of the central tendencies of the move toward liberalization is to throw all the assets into the casino of the stock market'. This metaphor captures the irresponsibility and unaccountability of the financialisation of the economy.⁶⁴ The logic of financialisation is tied up in short-term returns, a temporal logic that runs counter to the logic of natural cycles of reproduction. This then serves to exacerbate the metabolic rift.

Of particular concern for this thesis is that the financialisation of the economy siphons wealth from the poorest to the richest. It also further weakens democratic processes, both by being beyond the governance of nation states and by increasing the vulnerability of the poorest and weakest and conversely increasing the power of the largest conglomerates. As such it has awakened the ire of trade unions internationally. Thus in a paper for the International Labour Organisation, Rossman and Greenfield (2006: 9) write with respect to financialisation: 'The last quarter century of 'deregulation' involved the introduction of a vast array of new legal mechanisms and regulations by national governments to protect the interests of investors and shareholders.' These national arrangements to protect capital, they suggest, need to be dismantled. 'New legal mechanisms and regulations must be introduced nationally to subordinate investment capital to democratic requirements.' Financialisation also increasingly underpins an insecure global economy in the same time-frame as the increasingly unstable biosphere.

As Paineira (2009: 7) shows, financialisation since 2000 has resulted in 'flows of capital to the USA' because of the 'role of the dollar as international reserve currency' and which 'has allowed the USA to run very large trade deficits throughout this period'. He states: 'Financialisation has ... resulted in the

⁶⁴One of the many figures illustrating the vastness as well as the casino nature of the stock market and included in Foster and Magdoff's (2010) *The Great Financial Crisis: Causes and Consequences*, is the fact that daily trading on world currency markets averages about US\$1.8 trillion a day – a figure which equals the *annual* GDP of the whole world.

absurd situation of the poor financing the rich in the world economy, while allowing the USA to run vast trade deficits.’

Much of this financialisation activity is carried out by ‘secretive, unregulated investment partnerships’ (Foster and Magdoff 2010: 58). That carbon emissions trading schemes have become a major part of the territory of financialisation (as indicated in Chapter 3) does little to encourage faith in any ETS. At the same time this financialisation removes ETSs from any semblance of democratic control or direction, dangerously furthering the rift between humans and the environment. There is a deep disjuncture between the real economy and finance, with the additional factor of the proliferation of easy credit enabling citizen consumers to live beyond their means and encouraging patterns of unsustainable consumerism. This supports further over-production (and consumption) and thus energy, material through-puts and waste (Keen 2010). This scenario graphically captures the material essence of the carbon rift. Furthermore, banks, for example, have ‘increasingly turned away from financing corporate investment to directly tapping into wage earners’ revenue through mortgage, credit card and other forms of consumer debt’ (Rossman 2010: np). As we saw in the Global Financial Crisis, all of this contributes to an increasingly unstable and complex pack of cards which, when one card falls, leads to chaos. Add in global warming and we will have unprecedented human suffering.

Neoliberalism is characterised by the de-regulation of financial markets and trade, privatisation, economic reform (which essentially means privatisation) and the reduction of government services such as health, education and social welfare. At the same time, institutionally it seeks to strengthen the role of the market and de-unionise labour. It results in a shift in emphasis to the individual, the consumer, the ‘rule of the market’ and the minimisation of the concept of public good and community (Harvey 2005; Simon and McBride 2007). Deregulation in this context normally refers to the weakening or removal of regulation at a national level. Internationally, however, with the globalisation of the capitalist economy, international – and undemocratic – institutions such as the IMF, the World Bank and the WTO have become the

regulatory bodies, regulating trade and investment. Driven by a neoliberal ideology, these international organisations, it can be argued, are primarily under the control of the rich, the powerful and the large private, corporate bodies.

There are numerous dimensions to the consequences of the financialisation of the economy. One that can be missed is that it increases the fragility of democracy. The activities of the financial sector are global and outside the jurisdiction of any national government. Of great concern are the secrecy and complexity in the activities of this sector, placing financial activities beyond the scrutiny of people and democratic regulation. The consequences of free financial movement can be seen in Africa for example, where foreign debt increasingly becomes difficult to tackle because of large-scale capital flight. If due weight were attached to this capital flight, many sub-Saharan African countries would likely be net creditors rather than debtors. Certainly financial liberalisation has increased the size and ease of this capital flight. The South African study illustrated this point.

It is of note that writing in 2007, before the GFC, Palley (2007) suggested that 'financialisation may put the economy at risk of debt deflation and prolonged recession'. He was also concerned that the two decades up to then had seen increasing ratios in household debt-income and corporate debt-equity and he pointed to the inherent fragility and unsustainability this brought in its wake, 'because debt constraints must eventually bite' (Palley 2007: 3).

Thus fundamentally it can be argued that it was increased financialisation which led to easier access for households to borrowing and at the same time increased inequality in the economy. These were the very factors (or perhaps more correctly the inability to control these factors) that led to the GFC (Keen 2010). To that extent – that major extent – it can be argued that financialisation was the root cause of the GFC.

The impact of the growing financialisation of the economy is felt nowhere greater than in the agricultural/food production sector. As Rossman (2010: np)

writes: '[t]he fate of agricultural workers, a large percentage of the nearly 1 billion women and men who are now chronically hungry and malnourished, is increasingly linked to movements on commodity exchanges thousands of kilometres from the farms and plantations on which they work. This is the reality of financialisation'.

The growing financialisation of the economy is linked to capitalist expansion through another dimension central to this thesis, the demand and supply of electricity. As McDonald (2009: 5) writes '[e]lectricity may not be an innate feature of capitalist modes of production but it has become an essential one upon which to build new production systems and products that lend themselves to the rapid pace of change in contemporary global markets as the capitalist centre of gravity shifts towards the services sector (particularly finance), electricity becomes an even more indispensable input, heightening pressures for cheap and reliable supplies of electric power from the 'commanding heights' of this new global economy and the transnational elites that run it'. Thus, with growing financialisation, we can see the increasing dependence on electricity and a growing role for finance capital in national political decision making. Growth in the financial sector results in turn in a growing dependence on fossil fuels. This is occurring at the same time as the greater financialisation of the economy is resulting in the increasing percolation of wealth from the bottom to the top.

Financialisation brings with it an extent of control over the Earth and over global governance institutions by corporations which is not being adequately scrutinised nor is it adequately covered in Marxist theory. How can global institutions, which are themselves members of a political economy structure which is so dominated by the interests of capital accumulation, be expected, or entrusted, to formulate solutions to global warming? Yet, corporations are intimately involved in the course of policy developments around global warming at the international and national levels.

Finally, as Foster *et al* (2010) argue, the financialisation of the accumulation process results in increasing irrationalities including 'drawing ever more

destructively on the limited resources and absorptive capacity of nature, as the economy continually grows in scale in relation to the planetary system. The result is emerging and expanding ecological rifts that are turning into planetary chasms' (*Foster et al.* 2010: 29).

9.6 Conclusion

This chapter has drawn primarily on the work of Marx and Marxists to provide arguments of how and why the capitalist system can never be sustainable, and why the institutions of capitalism will never be able to save, resolve or restore the biosphere from the impact of global warming. It provides a theoretical framework to understand the severity and complexity of the problems faced in South Africa. At the same time the study of South Africa has given me important insights to allow me to grapple better with the theoretical structure built in this chapter.

It was in this way that my thinking around the theoretical content of the thesis developed and how in developing a theory to understand better the political economy of the ways in which global warming has been both caused and in many quarters denied I came to rely more and more on Marxist ideas. The answer to the question however regarding how helpful Marxism is in finding the road to the 'brave new world' is limited but it is of great assistance in formulating the principles that might underlie that new world.

This is perhaps not surprising since Marx was dealing with a consequence of the metabolic rift which he could not have foreseen. He did not nor could he have been expected to foresee that capitalism would lead to the current very specific threat of global warming (even if this phenomenon can be seen as an extension of the metabolic rift). That is why in chapter 12 the principles set out while drawing partially on Marxism do not rely nearly as heavily on them as did the examination of the causes of global warming. Any seeming disjuncture here is simply the result of a realisation on my part that these needed to be separated. It may appear neater, more coherent or academic if that had not occurred. To come up with principles for the future which only draw on

Marxism would seem to me to be trying to fit the square peg of resolving global warming into the round hole of Marxist thought.

The next chapter will look at the superstructures and the question of where the political power lies, particularly in relation to the state, markets and corporations. That chapter will also take a theoretical approach to the political economy of fossil fuels - a core component of the capitalist relations of production and a key to global warming - to conclude the theoretical criticism of global capitalism in relation to global warming.

CHAPTER 10 The political economy of power and global warming

10.1 Introduction

The aim of this chapter is to illustrate further the irresolvable contradictions between capitalism and sustainability. I do this by looking at the power relations in the global capitalist society. These have an international dimension, but also are replicated within nation states as illustrated in the study of South Africa. In both contexts, they are most keenly played out in relation to the state, to markets and to corporations. One could include power in relation to ideology - the hegemony of neoliberal ideology – but rather than taking that as a separate sub-set, I have included on culture and ideology in the discussion on corporations. No theoretical approach to global warming would be complete without a historical materialist approach to energy in general and in fossil fuels in particular, which are the source of the physical power that underpins the system of social and economic power which may wrench asunder the growing rift between humans and the environment.

Much of Marx and Marxism is concerned with power in society, conceptualised around the unequal power relations in the very social relations of production upon which the economy is built, social relations that give rise to the metabolic rift discussed in the previous chapter. It is these social relations, these class relations between the owners of the means of production and the labourers, which form the basis of the powerful/powerless dichotomy, intermediated by the state, that are central to discussions on the causes of and solutions to global warming. Twenty first century society has developed many layers of complexity in the structure of the economy, but the social relations captured in the concept of class, though ‘not a stable social configuration’ (Harvey 2005: 31) remain highly relevant today and particularly in relation to global warming.

The chapter next examines corporate power before, in section 10.3, homing in on corporate power in the fossil fuel sectors of the economy which are those most relevant to this thesis. Section 10.4 offers a conclusion to this theoretical critique.

Anarchist Michael Bakunin (front page of Chomsky 2003, *For Reasons of State*) wrote:

The State is the organized authority, domination, and power of the possessing classes over the masses the most flagrant, the most cynical, and the most complete negation of humanity. It shatters the universal solidarity of all men on the earth, and brings some of them into association only for the purpose of destroying, conquering and enslaving all the rest. This flagrant negation of humanity which constitutes the very essence of the State is, from the standpoint of the State, its supreme duty and its greatest virtue. Thus, to offend, to oppress, to despoil, to plunder, to assassinate or enslave one's fellowman is ordinarily regarded as a crime. In public life it is all transformed into duty and virtue there is no horror, no cruelty, sacrilege, or perjury, no imposture, no infamous transaction, no cynical robbery, no bold plunder or shabby betrayal that has not been or is not daily being perpetrated by the representatives of the state, under no other pretext than those elastic words, so convenient and yet so terrible: "*for reasons of state*".

In Marxist theory, the state plays an important role. Unfortunately, and somewhat oddly however, Marx left no coherent body of theory of the state. The state, its role in governance in relation to global warming, and ideas of the social contract around citizens, are all highly relevant to the thesis. The role of the state is effectively ambivalent under the capitalist system, although citizens look to the state to take care of them, particularly if potentially catastrophic events such as global warming should befall them. The state has access to the best scientific resources and has the responsibility both to keep citizens informed and to act on potential threats to citizens' wellbeing. The state

however, has the dominant role in defining the terms of this relationship and often chooses to pursue ends that are not necessarily in the best interests of the majority.

There is a wide range of views regarding the ways in which states are formed and how they act. Broadly, it is often assumed people give up individual or local group sovereignty to receive certain benefits, such as social order, various infrastructures and security. From the concept of the social contract arises the notion that legitimate state authority is derived from the consent of the governed. Philosophers of the 17th and 18th centuries such as Thomas Hobbes, John Locke and Jean-Jacques Rousseau built on the ideas of the social contract, thereby providing the theoretical groundwork for constitutional monarchies, liberal democracies and republicanism respectively. In democracies, such as South Africa, theoretically, the legitimacy of the state is grounded in its citizenship through the election process and the principles of accountability, transparency, freedom of speech and equality of opportunity. In reality the power-elite perpetuates the belief in the national 'we', drowning out any critique of the inherently conflicting interests between the different class interests in society, for example, on the one hand the political economic elite who owns and controls both the means of production and the ideology and, on the other, the people. The elected representatives, the parliaments, are presumed in democracies to represent the citizens.

Wright (2010) maintains that representative democracy has been a critical source of social stability in advanced capitalism. He draws on the work of Przeworski (quoted in Wright 2010: 281) who analysed both the 'dynamic reproductive effects of capitalist democracy' and how the 'mechanism by which capitalist democracy channels social conflicts in ways that tend to reproduce capitalist social relations'. The dilemma faced by socialist parties to avoid marginalisation was to participate in electoral competition, where, to win, they had to support policies that would attract middle class voters and if they won and wanted to remain in power, pursue policies 'which would foster robust capital accumulation' (Wright 2010: 282).

While elections by the people are a fundamental principle of democracy, the entwinement of the political elite with the economic elite and corporate interests constitutes very often a major departure from rule by the people. Examples of this were provided in the chapters on South Africa. For additional examples relevant to this thesis, we need look no further than the degree of influence coal mining companies have been able to exert over state, national and international institutions in policies relating to global warming (Pearse 2010) or the power of undemocratic bodies such as the IMF and the World Bank.

Many, however, such as Adam Smith, have recognised the potentially subversive influence of the state. He wrote: '[c]ivil government, so far as it is instituted for the security of property, is in reality instituted for the defence of the rich against the poor or of those who have some property against those who have none at all' (Smith 1976: 149). In reality, however, the state is more complex and dynamic than that. This is also true of the global capitalist political economy in which the elite in the South has joined the elite of the North in furthering their common interests against the interests of the poor and working classes the world over. Certainly at a national level, the state is often where there is a huge concentration of economic, political, social and cultural power. Globally the site can be the WTO, the IMF, the World Bank or the G20⁶⁵ but at both these levels the power of large corporations is also very much at play. Capitalism both spawns and depends on this concentration of power.

Power matters. In the context of global warming and particularly in light of the lessons learned from the study of South Africa in Part II, it follows that there is a need to focus on the sources of power in a society and how that power is reproduced. Navarro (2002) argues that, while these sources are multiple, class provides the frame within which the various power matrices – race, gender, national, regional and so on - operate. 'Class power is based primarily on the

⁶⁵ The G20 is a group of major advanced and emerging economies brought together in the wake of the 1997 Asian Financial Crisis. It includes South Africa.

ownership of resources, be they the means of production, knowledge or organisation' (Navarro 2002: 465-6). Thus while power is reproduced in many different spheres, state power and class power are often related (Navarro 2002). As Navarro writes (2002: 466) '[c]lass power is realized through the expression of political projects'. The obfuscation of not only the evidence about, but the required solutions, to global warming is a political project. As this thesis argues, it is not only the planet that is at stake; it is also the structure of class interests.

Writing on the power of the state, Harvey (2001: 14-15) maintains that there is a 'dramatic asymmetry' with the nation state being, on the one hand, the fundamental regulator of state-labour relations but, on the other, unable to regulate global financial capital. The state is now often merely the agent of large multinational oligopolists. Harvey (2001: 14) argues that the idea that the power of the state is 'dwindling or disappearing as a centre of authority in the age of globalization is a silly notion'. He writes that this 'distracts attention from the fact that the nation state is now more dedicated than ever to creating a good business climate for investment, which means precisely controlling and repressing labour movements in all kinds of purposively new ways: cutting back the social wage, fine tuning migrant flows, and so on. The state is tremendously active in the domain of capital labour relations' (Harvey 2001: 14) and in fact in all aspects of production and consumption. He points out, however, that in the relations between different forms of capital, the state has no power to regulate. This is because, since the 1970s, global financial flows have been beyond the domain of national regulation, affording money capital 'unprecedented autonomy' from the cycle of material production (Harvey 2001: 15). This was shown in the discussion on financialisation in section in 9.5 and also empirically in the study of South Africa.

Harvey writes of the 'ubiquity and volatility of money as the impalpable ground of contemporary existence' (2001: 15). This can be taken further. There is a lack of independence of the state from capital not only in regards to the regulation of labour (where the state also acts to the bidding of the corporate sector) but also on policy issues, such as are seen in relation to global warming,

including regulating carbon emissions, phasing out fossil fuel energy, coal mining and increasing corporate taxes. An inherent contradiction exists in the power of the state, in so far as it is the ruling class ruling, while at the same time it is argued by the state (i.e. the ruling class) that it is ruling in the interests for and of all. Concepts such as the ‘national interest’, ‘national identity’ and state-fostered common ‘enemies’ (such as ‘terrorists’, the Taliban, ‘illegal boat people’) build a vacuous national solidarity and help in this obfuscation of who holds power and in whose interests. In issues around global warming, when the power of corporations is beyond the governance and control of governments or when governments and ministers of government are so captured by the interests of corporations, the system is, and will remain, unable to act democratically, appropriately or decisively in the interests of the people.

10.2 Corporate power

I see in the near future a crisis approaching that unnerves me and causes me to tremble for the safety of my country corporations have been enthroned and an era of corruption in high places will follow, and the money power of the country will endeavor to prolong its reign by working upon the prejudices of the people until all wealth is aggregated in a few hands and the Republic is destroyed.

U.S. President Abraham Lincoln (quoted in Shaw 1950).

Abraham Lincoln’s prescience is remarkable. The recent granting of the rights of unlimited lobbying power by U.S. corporations, during U.S. elections, by the U.S. Supreme Court, is a harbinger of yet greater power to corporations and, conversely, a further de-legitimising of the state as a people’s democratic institution⁶⁶.

⁶⁶ Liptak (2010: np). It was stated that ‘The court affirmed that groups of passionate individuals, like billionaires - and corporations and unions after Citizens United - have the right to spend without limit to independently advocate for or against federal candidates.’

Following on from the previous section, here I outline how corporations represent a supreme vehicle for capital accumulation and, concurrently, for power which they are able to exercise in, through and over the state. The MEC in the South African study is an example of the convergence within the state of the enormous powers of the political and capitalist elite to steer the state in the direction of that elite's interests. It is a particularly poignant example because the state in South Africa had appeared to have been built on the promises of a more just and equitable life for the majority. The dynamics around such corporate power are further fleshed out here.

The objective of corporations is to maximise profit. The rising power of the corporate sector and the converse weakening, corporatisation and/or sidelining of democratic states and international institutions, such as the United Nations, are the consequences of a number of factors. Most significantly for this thesis, are the hegemonic ideology and economic principles of neoliberalism and the growing wealth and power of the mega corporations and oligopolies. As both a cause and consequence of this rising corporate power is the declining legitimacy of the state as a democratic institution and the exercise of a very thin concept of democracy in democratic nations. These are crucially important issues in finding and enabling solutions to global warming. The state and international institutions today do not serve the interests of the majority. In this context, it is to be noted that Stiglitz (2003: 105), having left the powerful post of senior vice-president and chief economist of the World Bank and co-winner of the 2001 Nobel prize in economic science, argued that the centrepiece of the WTO's policies (TRIPS) 'reflected the triumph of corporate interests in the United States and Europe over the broader interests of billions of people in the developing world. It was another instance in which more weight was given to profits than to other basic values, like the environment, or life itself.' In a biosphere-constrained world, the conjunction of corporate and state/international organisations presages disaster. The corporation is in essence and in practice the logical outcome of capital accumulation. Thus the enormous power of corporations is central to this thesis.

Corporations are a major, pervasive and growing influence on humanity and the planet. They touch on almost every dimension of our lives from education to health care, from controlling global food production and distribution to 'fixing' global warming and moulding an ideology to embrace all the dimensions of life. Globally today there are over 50,000 trans-national corporations which now constitute the major holders of global wealth (Owen 2010).

How did corporations arise and become so powerful? In neoclassical economic theory, there is a benchmark of the perfect world of perfect competition where commodities are produced by many firms, each accounting for only a small part of total output. This then leads to competition and in turn efficient use of scarce resources. The competitiveness of commodities in the market place depends on their relative cost, hence the cost of labour and its productiveness and in turn the scale of production. Marx, however, recognised both the instability of any economy based on such an assumption and its impossibility in anything other than theory. He saw there was an imperative in a competitive market to cut costs and expand production, a process which required constant accumulation of capital and ever new technologies. In *Capital*, Vol 3 (1970), Marx shows that through the twin processes of centralisation and concentration of capital, monopolies are formed. To explain, the concentration of capital refers to the process where individual capitalists accumulate more and more capital, thus increasing the absolute amount of capital under their control. Centralisation of capital is a complementary process which occurs when this capital rests in fewer and fewer hands, for example, through mergers and acquisitions when larger firms take over smaller firms. This was seen in the discussion of South Africa's MEC and financial sectors in chapter 6.

Under these processes, continually repeated, corporations end up capturing larger and larger shares of the market, for example, through mergers and acquisitions, leading to a growing concentration of capital. While the twin processes of mergers and acquisitions have 'waxed and waned' throughout history, 'in the last quarter of the twentieth century the process of centralization

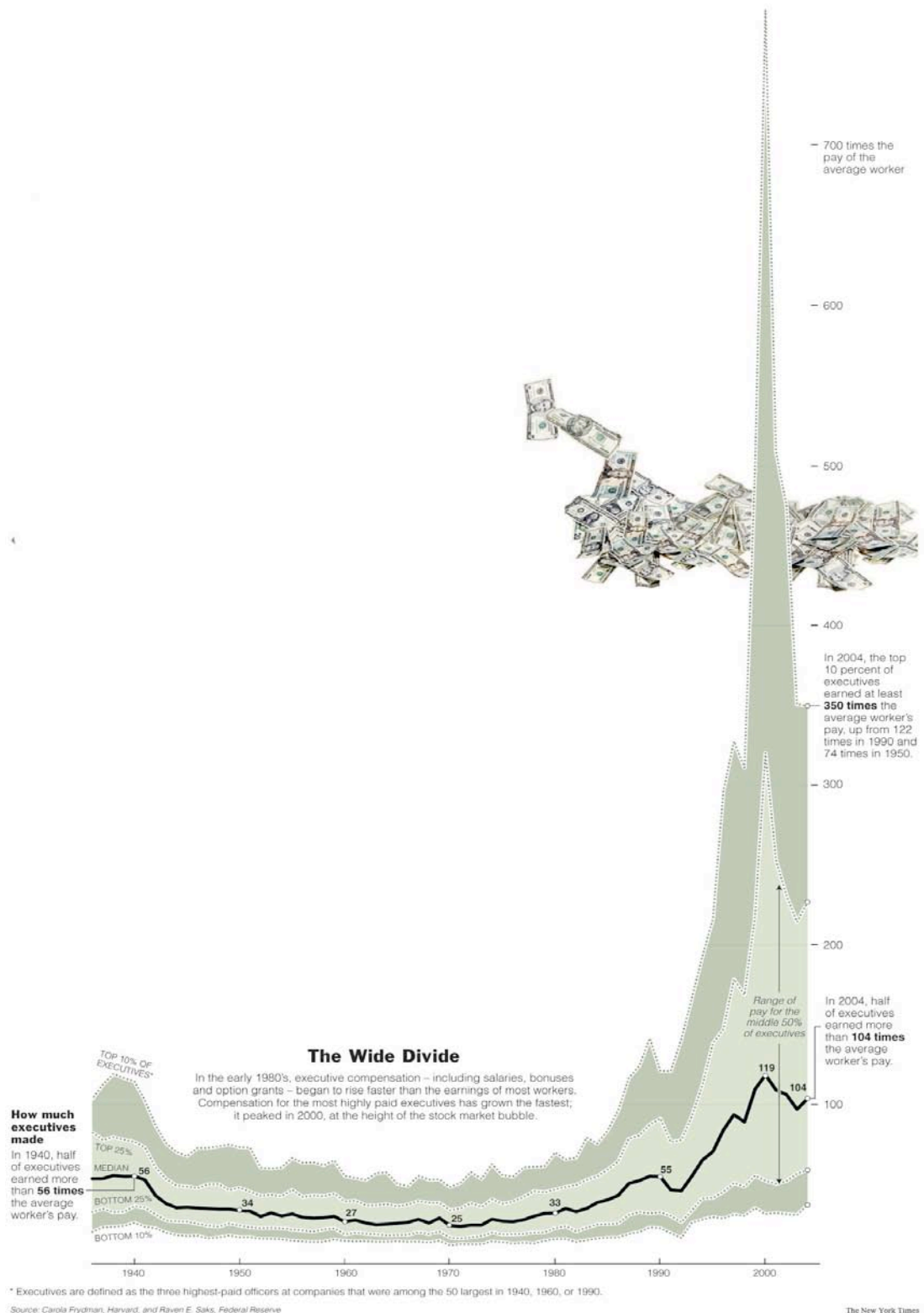
of capital [became] much more powerful than that of its concentration, but both processes have contributed to an enormous increase in the concentration of economic power among a handful of [transnational corporations]' (Bagchi 2005: 38). With that growth in wealth of the largest corporations has come a parallel growth in power. One material expression of this is the rate of transfer of wealth from workers to corporations which has increased exponentially.⁶⁷ Figure 10.1, from Ruccio (2010) and the Real World Economics Review, captures one aspect of this in the growing income difference between workers and top executives (see Figure 10.1, p243).

In the early 1960s executive compensation, including salaries, bonuses and option grants, began to rise faster than the earnings of most workers. Compensation for the most highly paid executives has grown the fastest (Ruccio 2010).

The concern about the growth in power of the corporations is echoed by Soederberg (2009) at two levels: 'the first is the tremendous power that corporations wield over all aspects of everyday life; the second is the dramatic rise of mass ownership [in the North] of these corporate behemoths' (Soederberg 2009: 3). Given the key role that corporations play in destroying the ecology, she suggests 'it is imperative that we identify and transcend the ideologically laden and class led nature of the corporate governance doctrine and begin to question critically who benefits' (Soederberg 2009: 159). I agree, and in researching for this thesis, find it remarkable how little academic inquiry there has been into the social, political and economic impacts of this power (but then, as discussed later in section with university capture by corporations, it is perhaps not so remarkable).

⁶⁷ Ruccio, D. 2010, Graph of the month: The wide divide

Figure 10.1 Income discrepancy Source: Ruccio (2010)



Drawing on a Marxist-informed framework, Soederberg (2009) shows how the doctrine of corporate governance has become obscured from view, in large part because of its very power and pervasiveness. The principal feature of corporate

governance is its legal obligation to return the highest level of profit to shareholders, putting it in clear conflict with the imperatives of truly democratic institutions. If we are serious in the quest to protect our institutions, features such as freedom and openness are the very elements which ought to make it essential for the power and pervasiveness of corporate governance to be transparent and understood. Corporations, in liaison with the state, have in effect depoliticised the structural relations of corporate domination and delinked, in the public mind, these relations from the wider power and contradictions of capitalism. Soederberg (2009) claims that the part ownership of corporations by the working class, especially through pension funds as part of global institutional investments, has tied Main Street to Wall Street, with Main Street increasingly dependent on and in turn supportive of Wall Street. This is a telling point given that the pensions market of countries in the OECD was valued at a massive \$24.6 trillion in 2006 (OECD 2007: 3). It is however a tying-in only materially or financially and not in terms of power; and a tying-in that still excludes the vast majority on the planet. As was very well demonstrated in the GFC, it does little if anything to shift the balance of political power to Main Street or indeed to democratically elected governments. These, often transnational, corporations are huge and become self-contained economies in themselves with enormous political power, as was demonstrated in the examples of corporate activities in South Africa around the coal and energy sectors.

As noted above, there has been an odd unwillingness (relatively speaking and given its very great importance not just economically but also socially) in academic research to examine the nature and dynamics of corporate power in neoliberal-led capitalism. This is matched by a failure to acknowledge the geopolitical significance of corporations, particularly the US corporations, in global capitalism. One aspect of this is that the Anglo-American forms of corporate governance are presented as the most efficient market-based arrangements and therefore a model that other countries, especially those in the developing world, should emulate. The South African study demonstrated how the parastatal corporation of Eskom, in expanding into sub-Saharan Africa, sets up this same idealised model.

Historically, family firms were replaced with bigger joint stock companies. These in turn have been replaced by corporations. Soederberg (2009: 8-9) argues that ‘one of the most transformative instruments in corporate history is the ownership or creditorship as a stock [share] or bond - especially in shaping the relations between those who own and those who control a publicly listed company’. It is largely because of this ownership arrangement that Main Street ends up relatively powerless in the control of corporations (even if technically the ownership of shares appears to convey power).

The power of corporations can be envisioned and interpreted in many different ways. Here the interpretation that I see as apposite for this thesis is based on seven considerations.

The first is that the corporation is best seen in the context of class relations. Corporate power cannot be separated from the wider struggles and contradictions of capitalism.

Second, explanations of the source of corporate power cannot be or at least should not be limited to the bounds of the doctrine of corporate governance. There is, I would argue, what might be termed a social legitimisation of corporate power as a result of the links that corporations have forged with the state and also the state with corporations. It is a two-way street. This results in both the corporations and the state pursuing the interests of the dominant classes in society and what amounts often to the corporatisation of the state. One particularly explicit facet of this is the so-called ‘revolving door’ syndrome in the United States, where not only millions are spent by corporations on lobbying the US government but leading government and corporate heads move almost seamlessly between high government office and high corporate office. In South Africa, it was illustrated that there is a strong merging of interests and identities in the political and economic elites. Third, the credit system is a critical feature in the growth in power of corporations. Soederberg (2009) argues that this represents a clear link between corporations and capital accumulation, endorsing Marx’s view of credit as the

principal lever of overproduction and speculation. Further, by expanding the pool of potential investors, credit brings benefits for capitalism, by fostering the perception of ending or at least reducing class conflict through the co-opting of workers' interests into those of capitalism.

A fourth consideration is that the capitalist state plays a central role in mediating, naturalising and depoliticising the corporate-financial nexus. This it achieves through the mantra of freedom, the free market, free trade and the freedom of movement of capital (but not labour). The state ends up defending the freedom of the market at the expense of the principles of freedom of the citizen, equality and openness.

Fifth, and relatedly, as Klein (2007: 15) argues, there can be no more profitable way (for corporations) to exercise and shore up their power than to be involved in organising society by seeking to erase the boundaries between the state and the corporations. This is what Klein describes as the 'triumph' of corporations under neoliberal capitalism. In *The Shock Doctrine* (2007), she highlights the collusion between the neoliberal doctrine, the interests of the leading capitalist economies and corporate accumulation. She writes of the policy trinity of neoliberalism: 'the elimination of the public sphere, total liberation for corporations and skeletal social spending' (Klein 2007:15). As the study of South Africa demonstrated, the adoption of neoliberal policies in that country at the time of the transition from apartheid to democratic rule is a case in point.

Sixth, one important aspect of corporate power and the elimination of the influence of the public sphere lies in the capture of universities under neoliberal governments. Historically these institutions have been a site for independent reflection and critique of society. With increasing corporate funding of research at universities, these once independent institutions of research, learning and scholarship are increasingly being transformed by the corporate sector. Of particular concern to this thesis, this includes funding of environmental science and sustainability schools. An added dimension of this is that corporations not only fund research in areas that are related to the

environment and global warming but are the major employers of environmental science graduates (Griffin 2010).

This is identified, especially in the context of the fossil fuel corporations in Australia, by Hamilton and Downie (2007). They write: 'In Australia over the last decade the fossil fuel industries have become steadily more involved in Australian universities. Fossil fuel industry associations and fossil fuel companies have spent millions of dollars funding research projects and sponsoring university chairs, academic posts and even entire schools' (Hamilton and Downie 2007: vi) They go on to point out that in 1999 'the Minerals Council of Australia set up the Minerals Tertiary Education Council with \$15 million to achieve 'cultural change in universities' (Hamilton and Downie 2007: vi). These resources show the extent of the close relationships between the universities and the fossil fuel corporations, using examples from the University of Queensland, the University of Western Australia and Curtin University of Technology.

However, more than simply influencing what is done in universities (as Hamilton and Downie also identify), they also influence *how* it is done, as managerialism and corporate governance become the dominant driving values of these institutions.

Finally an aspect that I have not come across in Marxist theoretical literature but is covered in development studies literature, by Shiva and even Rachel Carson's *Silent Spring*, is that beyond the dominance by corporations of key sectors in the economy, they also wield enormous power over the basic needs of human survival. This is at the very core of the metabolic rift where food, essential for human survival, is controlled by organisations which are undemocratic, unaccountable and far removed from people's control. While the study of South Africa looked at the coal and electricity sectors, it is the same market dominated institutions which determine the ideology and political economy of the elements even more immediate and essential for human survival, such as food production. Through ownership and control over all aspects of food production, from the ownership of seeds, pesticides, and

fertilisers, through to land ownership to the grain elevators, processing facilities, shipping companies and grocery stores (Magdoff and Tokar 2009), corporations now have a very significant and growing influence over global food supplies. Not unrelated, but less well understood and perhaps yet more insidious, is the patenting of genetic technologies, effectively giving corporations growing control and ownership of the genes at the very base of the human food chain.

A number of contemporary Marxists shed light on aspects of the growth of power of corporations and of monopoly capitalism more generally. Amin (2006: 4) for example, suggests that, after the Second World War, various powers came together to form a collective imperialism, the triad (USA, Europe and Japan), effectively transforming the global competitive conditions in which large corporations operated. Earlier, corporations 'waged their competitive battles essentially on national markets', whereas today they require markets of '500 to 600 million potential consumers' (Amin 2006: 4) and their competitive battles are now fought on a global stage. Amin (2006: 4) continues: '[t]ransnational corporations have common interests in running the world market [and the] dominant segments of transnational capital in all the partners of the triad have a real solidarity with one another that is expressed in the rallying to globalized neo-liberalism'.

There is an entwinement of elite interests, at the global, state and corporate level. This entwinement is especially relevant to global warming.

The neoliberal state is no longer the state of Keynes, a capitalist state but one which nevertheless did incorporate a degree of social welfare support for citizens. Under Keynesian capitalism, the state had the role of duty of care for its citizens and used public expenditure to promote the wellbeing of the less well off. Such state roles have been eroded and replaced by the market, as virtually the only basis for the allocation of resources. Thus the interventions by various governments in the wake of the global financial crisis (GFC) through stimulus packages may have appeared Keynesian in nature, although this in fact marked one of the greatest transfers of wealth from the working

class to the ruling class in human history. This to some extent marks the degree to which the state has been captured by the private corporate sector and the interests of capital. The various state responses to the GFC show clearly that the interests of the capitalist elite over-ride the interests of the masses and there is no reason to believe the state will act otherwise as the crisis of global warming is increasingly manifested.

The thesis emphasises that global warming is but one of a number of problems facing capitalism today. Certainly the accumulation of power in corporations and the links between that power and the power of the state, as we have seen in this section, have grave implications for any reasonably thick form of democracy. The separation of that power to serve the elite's own ends means that the vast majority of humanity continues to lose out, to be poor and to be disadvantaged. The repercussions that follow for global warming are clear, as the growing inequalities across the globe which have followed in the wake of neoliberalism and corporatisation of both the economy and the state, are not just in income but in power. There seems little concern to serve the majority and with that lack of concern an accompanying lack of concern for the planet. Nowhere is that clearer or more important than in the fossil fuel energy sector, as illustrated in South Africa in Part II. It is to that sector that the next section turns.

10.3 Corporate power in the fossil fuel energy sector

The key agents of both the rapid expansion of industrial capitalism and a direct and major cause of global warming are fossil fuels: oil, gas and coal. While the peaking dates⁶⁸ of coal, oil and gas production are not of such relevance to global warming, the projected peaking dates are a further reason why governments should be urgently taking steps to transform economies from their reliance on fossil fuel energy. The implications of not beginning the process of

⁶⁸ It is projected that oil supplies peaked in 2005, that coal also peaked in 2010 and that gas will peak by 2030 (Aleklett 2010). The Association for the Study of Peak Oil and Gas (www.peakoil.net/contact-us) has a comprehensive website of peer reviewed literature which covers peak fossil fuels and provides evidence we are passing the peak production levels of oil, gas and coal. This 'peaking' is discussed more in Chapter 11.

making transformative structural changes are profound and will have a major adverse effect on fossil fuel-dependent economies as early as the next decade.

Marx emphasised the crucial enabling role of power supply and transmission in the industrial revolution. The mechanisation of tools meant that capitalists were freed from the limitations imposed by workers' labour power as the direct motive force. The replacement of that power with other motive forces graduated from the use of animals, water and wind to coal driven steam engines and electric power (Marx *Capital* Vol 1, 1976: 496).

Huber (2009: 105-106) extends these ideas by arguing that 'fossil fuel energy represents a necessary aspect of capitalist production and circulation' and that the shift 'from solar-based energy sources (muscles, wind and water) to fossil-based energy sources (coal, oil and gas)' coincided with a 'dramatic shift toward the generalization of capitalist social relations'. He stresses that this was because of fossil fuels' particular characteristics for increasing productivity. Huber's view, which it transpires is central to both the way in which the problem of global warming and the solution are conceived in this thesis, is that fossil fuel energy needs to be reconceptualised in terms of social relations which are embedded in networks of power and socio-ecological change. The South African study illustrated some of these power networks enmeshed around the coal/energy sector.

10.4 Conclusion

This chapter and indeed the whole of Part III have been concerned with developing an appropriate critical theoretical perspective in which to place the development of global warming. It has sought to illustrate how the relationship between humans and the environment around the pursuit of sustenance is essential in building a picture of how a society works. It is on the basis of this most core of social relationships in capitalist society that Marx constructed a theory that enables us to gain a critical understanding of how global warming and the gamut of other intractable problems of political economy and society have developed. This part of the thesis has covered a selection of key points of

Marxist theory relevant to the thesis - the metabolic rift, alienation, capital accumulation and issues of class and power around the state, markets and corporations, cornerstones in attributing global warming to the global political economy of capitalism. It has sought to apply Marxist concepts to the contemporary global economy, again in relation to the ecology and global warming and to provide a context to the most recent developments in the global economy. These include the rise in the hegemonic power of corporations and growing financialisation, the latter of which is designed to enable a new aggressive thrust to the momentum of capitalist expansion and a new dimension to the metabolic rift between humans and nature.

Thus the problems of global warming and the other crises of capitalism have their embryonic roots in the earliest stage of capitalism and primitive accumulation. This continual process of accumulation throughout the whole history of capitalism has exacted an enormous cost on various populations and environments. One can argue that that history is the history of ongoing crises, geographically separate but connected through the never ending growth and thrust of a particular political economy throughout the past four centuries that today has resulted in a convergence of crises which is taking humankind to a critical threshold for survival.

Of course, Marx and Engels could not be expected to reach into the future, our present, and foresee the detailed complexities that have arisen around, for example, the corporate/state power nexus, financialisation and the various technologies and social relationships which have subsequently developed. Nevertheless, Marx's work and Marxism provide the key elements of my theoretical framework for understanding contemporary capitalist society and its crises, and in particular the developments that are encapsulated under the heading of the political economy of global warming. That body of work however in my view falls short of allowing adequate sight of the way forward from here in dealing with the threat of global warming. To place the whole thesis within a Marxist framework was however never the intent. Indeed as explained in Part III, the relevance of Marxism as a theoretical and conceptual framework 'emerged' to help to explain the political economy phenomenon of

global warming as the thesis developed. It was my researching into the political economy ‘global microcosm’ (Amin’s words) of South Africa in part II of the thesis that led me to that Marxist framework. I submit that that framework has served me well in analysing the development of global warming in a political economy context. That does not mean that, looking to the future, a Marxist framework will continue to be the most relevant nor at the same time will it necessarily be wholly redundant.

Relevant here in this shift from past to future is what Bolivian President Evo Morales (2009, quoted in Bond 2011: 13) stated before the World People’s Conference on Climate Change⁶⁹ ‘we can’t look back; we have to look forward. Looking forward means that we have to review everything that capitalism has done. These are things that cannot just be solved with money. We have to resolve problems of life and humanity. And that’s the problem that planet earth faces today. And this means ending capitalism.’

Ending capitalism is the goal and thus I endorse Morales’ words. The mechanisms for the ending of capitalism are currently far from clear. Marxism provides only partial answers and in my view we cannot expect complete answers from Marxism. There are various signs in the Arab Spring and the Occupy movement.⁷⁰ The fact that so soon after the Global Financial Crisis of 2008 we are facing another with the political stalemate to deal with the economic crisis in the Eurozone. COP 17 may give rise to a greater recognition that radical change is needed.

Underlying these symptoms of the crisis facing capitalism, and I submit that these are but symptoms, is the growth in inequality and power across the planet and within nation states. That inequality may turn out to be the harbinger of death for capitalism as it is significant that the levels of inequality in the US immediately prior to the Global Financial Crisis had only been reached previously immediately before the Great Depression in 1928 (Saez 2009) .

⁶⁹ The *World People’s Conference on Climate Change and the Rights of Mother Earth* was held in Cochabamba Bolivia in 2010. The conference was attended by about 300,000 people, many from grassroots movements from the South.

⁷⁰ See Chomsky 2011 at <http://www.democracynow.org/se0/2011/5/11noam-chomsky-the-us>

Global warming is already exacerbating such inequalities and one can readily argue that it will be the effects of global warming on inequality which will precipitate capitalism's end. The thesis could speculate at length on the mechanisms that might lead to the demise of capitalism but that would be another thesis in its own right.

South Africa provided the thesis with a microcosm of this capitalist global political economy and the growing social rift between those who enjoy the benefits and those who carry the burdens, and the ecological rift between society and the ecology. It showed the destruction that occurs to the environment and communities as the system expands. It also illustrated the increasing fragility of that system by looking at certain particular aspects such as the financial sector and the insecurities and injustices associated with this sector; the damage to the ecology felt most by those who most immediately and closely depend on it; or the lives that are destroyed by a system which promises so much and yet, to many, delivers so little. Turkish writer Orhan Pamuk (2001:12) states: 'at no time in history have the lives of the rich been so forcefully brought to the attention of the poor through television and Hollywood film. But far worse, at no other time have the world's rich and powerful societies been so clearly right, and 'reasonable'. Pamuk continues (2001: 12):

Today an ordinary citizen is aware of how insubstantial is his share of the world's wealth; he knows that he lives under conditions that are much harsher and more devastating than those of a 'Westerner' and that he is condemned to a much shorter life. At the same time however, he senses in a corner of his mind that his poverty is to some considerable degree the fault of his own folly and inadequacy, or those of his father and grandfather.

The fragilities, insecurities and injustices of the global capitalist system and its inherent unsustainability are nowhere more evident than in the 'modernisation' that is capitalisation and industrialisation of food production, a transformation

that is occurring with growing momentum on the African continent⁷¹. Because of the imperative of food security for all people, and the fact that obtaining food is an essential site of intersection between humans and the environment, I will return to this in looking at the principles and structures of future societies in Part IV.

One of the problems in criticising capitalism and calling for its end is the lack of conceptualisation, at least in the West, of an alternative. The next chapter (Chapter 11) puts forward some key principles which, it is argued, must be adopted in building theories and practices in social organisation that have the potential to be enduring in the future, if we do manage to avert ecological catastrophe.

In doing so I acknowledge immediately that these principles are not uniquely Marxist although they are heavily Marxist-orientated. There may be a way in which continuing on the Marxist road of thought could get us there more comprehensively. I do not agree. This difference may arise because I did not start out on the road of the thesis with the avowed intent to follow a Marxist theoetical framework as I have sought to make clear. I ‘found’ the Marxist road as the thesis developed and this is why the theoretical section comes as late as it does in the thesis and why the South African experience was not a case study in the normal sense but as explained a microcosm of the global political economy.

Having proceeded down that road, I did then look to Marxism to help to provide the principles for the future. To some limited extent they did but the fit was far from adequate. I was using Marxism in an almost pragmatic way to provide a critical materialist theoretical framework to seek to understand the phenomenon of global warming as one of the crises of capitalism. I then had an open mind about how the

⁷¹ Drivers including white, industrial-scale South African farmers. A mass movement of white South African farmers in what is called the ‘next great trek’, is occurring on the African continent. The movement is supported by Agri South Africa, an association that represents 70,000 South Africa farmers. Agri SA has offers of land from 22 African countries, including with free land come tax holidays, free reign to export produce and profits, and promises of new roads and power lines – angering local peasants who have never enjoyed such benefits. For example, Congo-Brazzaville has offered South African farmers long leases on up to 10m hectares of land. In these deals, South Africa is not only exporting its farmers, but industrial scale farming and neoliberal values to the rest of the continent (Pearce 2011), while disenfranchising local farmers: accumulation by dispossession.

future might best be addressed. A Marxist might have taken a different perspective and most certainly a different route.

So from the considerations surrounding the theoretical issues that emerged from the analysis of the political economy of South Africa and especially its coal and electricity sectors, what might the principles be that might serve to underpin societies able to address global warming in the future? Clearly the divide - even chasm - that has opened up between humanity and nature, Marx's metabolic rift including the carbon rift, is a major starting point. Environmental restoration here is essential.

Immediately related to this is a second form of restoration, the restoration of the commons for the benefit of all, and all species. A third principle must address the issue of the social relations of production and think through the question of what is to be meant by the community of producers. Related again is the question of production of what and for whom giving rise to questions around the principle of food security my fourth principle.

South Africa also helps to identify or simply underlines the need for two other principles involving major redistributions one of resources and the other of power with for the latter a move away from a class based system and a move towards a more genuine form of democracy.

The dependence on fossil fuels in a growth economy such as South Africa's suggests that for the future such dependence must be broken (giving me my sixth principle) and continued economic growth cannot be sustained without that fossil fuel dependence. The future must be based on no-growth economies.

These principles are addressed at length in chapter 12.

PART IV THE FUTURE

With regard to looking to the future, I would first want to refer to the work of Harvey (2010: 223) who writes that '[i]t has long been the dream of many that an alternative to capitalist (ir)rationality can be defined and rationally arrived at through the mobilisation of human passions in the collective search for a better life for all'. These alternatives Harvey (2010) claims have been historically called socialism or communism - both of which have been tried in various times and places but are now widely dismissed.

For Marx and Engels communism was not seen as a "master plan" but 'as a means of organizing the workers' movement and structuring and guiding debate in and around it' (Burkett 2009: 331), an approach consistent with what they saw as a difficult and prolonged process of transition to communism (Burkett 2009: 331). Burkett continues (2009: 331-2), '[communist production is not simply inherited from capitalism; it requires "long struggles, through a series of historical processes, transforming circumstances and men"'. He adds, the 'transition to a communal system of sustainable human development is by nature a highly path-dependent co-evolutionary process ... [with] communism's human developmental preconditions [being] ... generated in large part by the revolutionary struggle itself' (Burkett, 2009: 332). The problem of this situation is that the science is telling us we do not have time for a long struggle.

Today, as Harvey (2010) writes, there are all sorts of small-scale experiments being undertaken around the world which reflect some sort of convergence between Marxist and anarchist traditions which draw on collaboration evident in the Marxist camp before the schism between Karl Marx and anarchist Michael Bakunin in the 1860s. That is, these alternatives to capitalism involve forms of collective social organisation to 'displace market forces and capital accumulation as the basis for organising production and distribution' (Harvey 2010: 225). However, as Harvey maintains, there is no clear path outlining the process of transformation from the current multitudinous crises of capitalism to a better world.

Amin (2008), in *The World We Wish to See*, writes of the challenges of building a globally cohesive opposition to the world capitalist system as a result of unequal

development within the system between the centres and peripheries and the competitions between different interests within the centres and peripheries. In raising the issue of the diverse forms of labour's subjection, Amin notes that this 'precludes reducing the political actors on the world stage to simply the bourgeoisie and proletariat ... [resulting in] fragmentation within ... resistance struggles' (Amin 2008: 8). At the same time, he acknowledges the advantages of this diversity for the dominant classes who are able to exploit it. Of central relevance to this thesis, is Amin's point, that it is not possible to 'change the world without taking power' (Amin 2008: 37) and that that power is 'related to the concentration of capital and the centralization of power that is connected to it' (Amin 2008: 48). This is a central issue of this thesis - the concentration of power that is central to the South African political economy - around the MEC; in the theoretical section in discussion of corporations and financialisation; in the convergence of the interests of capital and state; and in the power of the oligopolies and the systems built around them, that will preclude real solutions to global warming being implemented. There is currently no coherent global movement to tackle this hegemonic concentration of power.

Amin (2008: 70-1) writes of 'opening the debate on the long transition to socialism' and the need for an effective action strategy - the first condition of which is 'obviously the defeat of Washington's project for military control of the planet', and the need to rebuild and radicalize social resistance against the offensive of imperialist capitalism' (Amin 2008:74). This is true, but again, it does not reveal the 'how'.

Harvey agrees that while there is a sense that a better world is possible, the critical problem is that there is no 'sufficiently unified anti-capitalist movement that can adequately challenge the reproduction of the capitalist class and the perpetuation of its power on the world stage' (Harvey 2010: 226-7). There is thus a dual problem of the lack of an alternative vision underpinning a global oppositional movement and a lack of a global oppositional movement to implement the vision. The question, as Harvey entitles his chapter 'What is to be done? And who is going to do it?' (Harvey 2010: chapter 8) is a huge one. I take comfort in acknowledging that answering it appears to be beyond the scope of such thinkers as Harvey and Amin. It is beyond the scope of this thesis. It is a thesis in its own right. At this level the thesis attempts to make a

small, considered contribution to the discussion on what sort of principles should underpin future just, equitable and sustainable societies. These principles have emerged in the thesis as a result of critically examining the unsustainability of capitalism and the impossibility of the problem of global warming being solved in a world dominated by the capitalist relations of production. Given the long years of struggle that will be necessary to build a sufficiently broad based global opposition movement to overthrow the capitalist system and the timeframe the science is telling us we have for the reduction of global carbon emissions (alone) to maintain the biosphere within the limits conducive to human and other species survival, I can not foresee that society will be able to stop the disastrous trajectory that we are on. I think this conclusion is realistic. Nevertheless, I prefer to remain idealistic, and hence offer idealistic principles. I believe we have little more than idealism but remain hopeful that the will and commitment for broad based and global political mobilization will emerge.

The thesis so far has been primarily a theoretical and empirical criticism of capitalism in the context of global warming. Part IV now draws on the lessons to be learned from Part II of the thesis and from the theoretical critique of capitalism developed in Part III to look to how both to overcome the problems thereby identified and to build for some positive future. It thus combines messages arising in practice from South Africa in Part II with the theory of Part III, to show that other models of human social organisation are not only possible but can address many of the crises and contradictions emanating from capitalism, including the crisis of global warming. Neither the critique embodied in the South African study nor that in the theory in Part III provides a comprehensive guide to provide a blueprint or 'checklist' for future societies. Rather this part of the thesis builds on these critiques, learns from them but rejects the idea of simply reacting against them. That would have serious risks, not least in thereby having the past dictate the parameters for the future. That has to be partly true but Part IV avoids a slavish dependency on any past structuring of ideas. The focus in Amin's 'microcosm' that is South Africa cannot of course cover all relevant issues; the theoretical critique could not be

so detailed as to address all aspects. Thus considerations of, for example, the relevance of Indigenous knowledge are added to the mix in looking to the future.

This is a more pragmatic approach than others might have taken. It is not that the idea of principles would have been foreign to a Marxist approach if I had sought to continue specifically within a Marxist paradigm. Marx in his thinking seemed to be very much at ease with the idea of principles but it was Engels who expressed better what I would want to think of as principles. In the *Anti-Duhring* (Engels 1947) he wrote:

When we consider and reflect upon nature at large or the history of mankind or our own intellectual activity, at first we see the picture of an endless entanglement of relations and reactions in which nothing remains what, where and as it was, but everything moves, changes, comes into being and passes away... But this conception, correctly as it expresses the general character of the picture of appearances as a whole, does not suffice to explain the details of which this picture is made up, and so long as we do not understand these, we have not a clear idea of the whole picture. In order to understand these details we must detach them from their natural or historical connection and examine each one separately, its nature, special causes, effects, etc.

...

the principles are not the starting-point of the investigation, but its final result; they are not applied to nature and human history, but abstracted from them, it is not nature and the realm of man which conform to these principles, but the principles are only valid in so far as they are in conformity with nature and history. That is the only materialist conception of the matter.

The task of this part is to make a contribution to the discussion of what are key elements for building sustainable societies. It is written on the premise that positive, enduring and deep social, political and economic changes are not only necessary if human society is to continue, but are possible. It assumes that

there is time before catastrophic tipping points are passed - an assumption based on shaky ground - and that urgent, deep and transformative change can happen. Such change will be outside the market mechanisms currently on the table such as carbon taxes and carbon trading; will involve structural changes around the social relations of production; and will place constraints on energy and material resource use. This chapter provides not a blueprint for the future but broad principles to underpin a sustainable future. It presents a picture that is radically different from the world in which we currently live. It learns from that but is more than – has to be more than – simply a reaction against that.

In thinking about how to address the future, I have drawn on a construct from Vanberg, (1994) on the idea of a set of principles or, as he goes on to call these, a ‘constitution’. Vanberg, in his analysis of organisations from an institutional economics perspective, sets out three paradigms: the goal paradigm; the exchange paradigm; and the constitutional paradigm. The goal paradigm is a common notion and is easily understood. Organisations can have ‘goal-directed systems’ (Vanberg 1994: 126). With the exchange paradigm, organisations are ‘portrayed as a network of exchange relations among persons who make contributions ‘to the organization’ in return for the inducement that they receive ‘from the organization’’ (Vanberg 1994: 129). Finally and most relevant to this thesis is the constitutional paradigm. ‘Instead of concentrating on the ‘goals’ that organizational action is supposedly directed at, it draws attention to the procedural foundations that organizational action is based upon. It concentrates on the social mechanisms that bring about the intra-organizational co-ordination of individual choices and actions’ (Vanberg 1994: 135). He argues that: ‘When a group of persons establishes an organization by pooling resources for joint or combined use, they establish – explicitly or implicitly – a constitution’ (Vanberg 1994: 136).

This construct from Vanberg, while different, has echoes of Marx’s economic basis of society. Marx used different language and was directly concerned with societies while Vanberg’s immediate concern is with organisations. What I see as useful in Vanberg, however, is that his principles or constitution can be moved to a societal base and the construct of a constitution developed on the

basis of the values of the community. That can then indicate in more Marxist terms how the social relations are organised as humans pursue their production of food, clothing, shelter and so on. This constitution can thus be used to reflect solutions to many of the criticisms of capitalism aired in Part III as well as responding to the reality of the now very real constraints of the biosphere.

Thus in setting out the principles and institutions for societies for the future, what I am doing is trying to establish a 'constitution', a set of principles, that these future societies are 'based upon'.

CHAPTER 11 Getting to the future

11.1 Introduction

Is there a way forward other than simply in principle? Are there real life examples of socio/economic models which have been adopted by communities or nations in building more equitable or sustainable societies? Can we learn from these both how we might not only proceed with transformative economic and societal changes but also how to acknowledge their limitations *vis-à-vis* these changes. This chapter looks at some examples of these to show that another way is possible; that some people not only have or have had visions of better societies but have also been successful in transforming a part of their world into something more just, more resilient and enduring. This provides some practical guidance for building some of the principles to be included in a 'constitution' as set out in the next chapter.

Examples at the micro level are many. I have chosen to report on the South African one because it is one with which I am particularly familiar. The transitions town discussion covers, as far as I am aware, a unique series of actions but there are many individual actions of a similar kind. Cuba is in a sense unique but other countries and regions have some of the same features but not all. The state of Kerala in India and Venezuela are probably the best known of these.

In examining these issues it is timely to look back at the objectives of the thesis. The main objective is to research the question: can capitalism solve the problem of global warming? The final objective (number 6) is particularly worth recalling here:

'To develop alternative core social, political and economic principles compatible with a diversity of just and sustainable futures. For this objective, I use some historical examples of transformative change and based the core principles being proposed for future sustainable societies in large part on a response to the Marxist critique of contemporary unsustainable society.'

With respect to the main research question, we might try to take the stance adopted by Ha-Joon Chang in his ‘secret history of capitalism’ in *Bad Samaritans*. There he argues (Chang 2008: 16):

there are certainly some people in the rich countries who preach free market and free trade to the poor countries in order to capture larger shares of the latter’s markets and to pre-empt the emergence of possible competitors. They are saying ‘do as we say, not as we did’ and act as ‘Bad Samaritans’, taking advantage of others who are in trouble. But what is more worrying is that the history of capitalism has been so totally re-written that many people in the rich world do not perceive the historical double standard involved in recommending free trade and free market to developing countries.’

He suggests too that such people who in fact may be well meaning and believe falsely that markets are the way to prosperity may actually be more of a problem for developing countries than those ‘knowingly engaged in ‘kicking away the ladder’.

It would be good to share Chang’s optimism that the majority of Bad Samaritans ‘are neither greedy nor bigoted (Chang 2008: 221), and he cites the period from 1950 to the emergence of neoliberalism at the end of the 1970s as an example of a time when the ‘rich countries, led by the US, did not behave as Bad Samaritans’. He goes on (Chang 2008: 222): ‘The fact that rich countries did not behave as Bad Samaritans on at least one occasion in the past gives us hope.’ I am not as clear as Chang that that era does constitute a period of Good Samaritanism. The fact that even then he can cite only one occasion does bring to mind the notion that one swallow does not make a summer!

This chapter also looks at the issue of how to make the transition to a new world, particularly given the time constraints science is saying we face to prevent run-away global warming. There is a vast literature on political economy transformation (see for example Ellman 1997). Much of this focuses

on the transition from socialist economies to market economies; some on structural adjustment programmes; as well as some from the broad school of modernisation theory which examines the transition of peasant societies to modern societies (Mol and Spaargaren 2000) but a much smaller literature is more immediately relevant to the sorts of transformation needed to address global warming (see Andreasson 2010). Where there is a gap in this literature however is on the transition from global industrial capitalist society to no growth, community based, localised economies. This has to be the focus here.

Chapter 11 thus turns to the process of transformation using a few concrete examples. These are presented to try to aid our understanding of the nature and seriousness of the radical and rapid change that is necessary to save the planet. The chapter however can do little more than raise issues in relation to transformative change. To delve into that in greater detail would be a thesis in its own right. All that I seek to achieve here is to indicate two things: that radical transformation is possible; and that it has happened, even if (obviously) not to date in the specific context of global warming.

In section 11.2 there is a recapping of some of the key theoretical problems identified in the thesis and which need to be addressed in any future society which can secure a future for the planet.

The question then arises about the practicality of such future societies. Inevitably at present no economy exists which embraces the sorts of principles that might be sought for the future with, to some extent, the exception of Cuba. There are however currently some macro and micro examples of social units which have adopted some of the characteristics essential for building future societies. Since in practical terms these are all we currently have, they are worth exploring and that is done in section 11. 3.

The examples presented in that section are at different levels. Abalimi Bezekhaya in South Africa is very much a micro example among the poor of Cape Town which illustrates how the availability of land and small scale inexpensive support can bring not only food security to people, but a sense of

mutuality, community, personal empowerment and connectedness to others. Scaling up from this, transition towns are a social movement that is seeking to build from the micro to the macro. The example of Cuba is an example of a state which has undergone a radical transformation process. Each of these examples provides some insights into how aspects of future economies might operate, which is the subject of the next chapter. The section ends with an attempt to draw some practical lessons for future societies from these quasi pilots. In 11.4 Cuba is discussed on its own, in essence because it is an example of both a society which helps us to envisage the sorts of principles we are looking for (and which are set out in Chapter 12) but also a case study of how transition can occur. Section 11.5 concludes and looks forward to the principles of the kinds of societies we might want to see in the future.

11.2 To the future recognising the theoretical concerns

At this point it is worth recapping on some of the key theoretical problems that have been identified in the thesis and which need to be addressed in any society which can secure a future for the planet.

Most fundamentally, as has been a major theme of the thesis to date, the issue that has to be overcome is that the planet is permeated with the impact of the globalised political economy of capitalism. There is also the division between humans and the ecology as a result of the capitalist social relations of production which have been identified as central to the problem of global warming. The lengthy history of environmental degradation and human dispossession and displacement, that have occurred as part of the process of global capital accumulation through to today, now constitute a potentially fatal threat taking the Earth's system beyond the stable geological period in which human civilisation developed. At the same time the thesis has argued that global warming is but one of a number of crises of capitalism.

Relevant here as noted previously is Fisher's (2009: 7) observation 'that it is easier to imagine the end of the world than the end of capitalism'. Yet the thesis is clear that we must and thus not give in to the fatalism of Fisher and 'the widespread sense that not only is capitalism the only viable political and

economic system, but also that it is now impossible even to imagine a coherent alternative to it’.

Thus capitalism has given rise to this schism between humans and nature as expressed in both the metabolic rift and the carbon rift. These cannot be resolved by mechanical solutions but require social and economic structural transformation.

Alienation is crucial where such alienation has been explored most satisfactorily from the standpoint of this thesis by Rutherford (2008) when he argued that the sustained affluence in the west has resulted in a powerful growth in a liberation ethic of self-expression and within which ‘the ideological weapon of neo-liberalism and the new technologies of information and communication [are] key resources for creating the new regimes of capital accumulation’.

At the heart of all of this are class relations, the social relations of exploitation of one group of people by another and which lie at the epicentre of the ecological rift. This applies also at the level of the globalised economy where there is a hierarchy of states and where as Navarro (2007: 19) argues, ‘[n]eoliberal ideology provides the linkage among these classes’ with the commonality of ruling class interests outweighing the tensions of difference.

The significance of class to global warming is profound. The incessant drive for growth for the benefit of ruling class-based profits and capital accumulation is directly linked to the exploitation of both labour and land. Foster *et al.* (2010) argue that the overexploitation of nature’s resource taps and waste sinks, under the capitalist system, has reached the point where both are negatively impacted, firstly at a regional, then at a planetary level, affecting the climate and the biosphere itself. This situation is further evidence for a major conclusion of this thesis: the need for economic regime change.

The imperative for accumulation is gathering momentum with new ways being found to bring additional forms of alienation and exploitation into play further deepening the metabolic rift. One of these new forms of capital accumulation is financialisation which brings with it an extent of control over the Earth and over global governance institutions by corporations which is neither adequately scrutinised nor I would submit adequately covered in Marxist theory. How can global institutions, which are themselves members of a political economy structure which is so dominated by the interests of capital accumulation, be expected, or entrusted, to formulate or even be part of the solutions to global warming? Such financialisation draws 'ever more destructively on the limited resources and absorptive capacity of nature, as the economy continually grows in scale in relation to the planetary system. The result is emerging and expanding ecological rifts that are turning into planetary chasms' (Foster et al. 2010: 29).

In highlighting these issues the thesis also has expressed a somewhat different type of concern. While in Marxist theory, the state plays an important role, unfortunately, Marx left no coherent body of theory of the state. Yet concerns about the state, its role in governance in relation to global warming, and ideas of the social contract around citizens, remain highly relevant to the thesis.

Another concern that I have not come across in Marxist theoretical literature (but it is covered in development studies literature) is that beyond the dominance by corporations of key sectors in the economy, such corporations wield enormous power over the basic needs of human survival. This is at the very core of the metabolic rift where food, essential for human survival, is controlled by organisations which are undemocratic, unaccountable and far removed from people's control. Through ownership and control over all aspects of food production, from the ownership of seeds, pesticides, and fertilisers, through to land ownership to the grain elevators, processing facilities, shipping companies and grocery stores (Magdoff and Tokar 2009), corporations now have a very significant and growing influence over global food supplies.

As the thesis has also noted there has been an entwinement of elite interests, at the global, state and corporate level which is immediately relevant to global warming. Huber (2009: 105-106) extends these ideas by arguing that ‘fossil fuel energy represents a necessary aspect of capitalist production and circulation’ and that the shift ‘from solar-based energy sources (muscles, wind and water) to fossil-based energy sources (coal, oil and gas)’ coincided with a ‘dramatic shift toward the generalization of capitalist social relations’. He stresses that this was because of fossil fuels’ particular characteristics for increasing productivity. Huber’s view, which it transpires is central to both the way in which the problem of global warming and the solution are conceived in this thesis, is that fossil fuel energy needs to be reconceptualised in terms of social relations which are embedded in networks of power and socio-ecological change.

At this point bringing these issues together from the earlier theoretical discussions in the thesis is helpful in thinking about some current practical real life communities and societies which might in some ways exemplify the principles that might underlie future societies and in turn help us to identify these principles more fully. The former are set out in the remainder of this chapter; the latter are addressed in chapter 12.

11.3 Micro and macro examples of the future

11.3.1 Abalimi Bezekhaya

Abalimi Bezekhaya’s⁷² ‘Harvest of Hope’ program in South Africa is an example of urban agriculture. The program provides urban organic micro-farming support and access to outside markets to cash-poor urban micro-farmers to sell their produce. It seeks to achieve ‘poverty alleviation, food security, sustainability, income generation, job creation, environmental renewal, community based nature conservation, healthy diets, HIV/AIDS alleviation and climate change mitigation’ (Small 2010: 1). The target

⁷² Abalimi means ‘the Planters’ in Xhosa, the predominant local language.

population are very poor people located in South Africa's townships who are 'trying to survive and advance, are constantly shifting and moving about, often divided and disempowered, easily distracted and always looking for greener pastures' (Small 2010: 1).

I visited one of the sites of Abalimi Bezekhaya, in the Gugelethu township outside Cape Town, in May 2010. It is an inspiring story set in a township that in a very real sense captures many of the contradictions and problems of industrial capitalism and contemporary South African society. The project was bounded physically on one side by a state-of-the-art six-lane freeway, on the other three sides, by slums. It was unpromising land, criss-crossed with high voltage electricity lines and subject to floods and 40⁰ temperatures. It sat amidst the shack dwellings of the poor, the sick, unemployed and marginalised black population, many of whom had no access to water or electricity. The energy and technologies used are small scale and simple: the women are the energy and the technologies are spades, picks and knives; hemp string for tying bundles of vegetables together; an old small shed for tool storage; and some tins for sitting on and washing the vegetables.

Abalimi Bezekhaya had initially been a Quakers' project amongst the urban poor of Cape Town. Today, however, it is managed by its Director, Rob Small and the incorporated Abalimi organisation. The project aims to 'maintain permanent organic food growing and nature conservation projects as the basis for sustainable lifestyles, self-help job creation, poverty alleviation and environmental renewal' (Small 2010: 1). This it achieves and, as such, is an approximation at a micro level of urban agriculture and a part of what a new economy, post-capitalism, might contain.

Small, the Director, claims that the Abalimi initiative proves that 'under-educated, unemployable South Africans can live healthy lives, with dignity, on very small pieces of land, in the worst possible climate and conditions, and earn a decent income, using their own initiative and with only a very modest amount of assistance' (Small 2010: 1). For less than \$A15 per month, farmers produce fresh food and unlimited potential for self help. At the same time they

have transformed formerly wasted environments and re-established Indigenous conservation areas. Additionally, they are sinking 1–2 kilograms of carbon per square metre per annum. Small (2010) writes that such micro farms can not only transform family and community health but have powerful social benefits, improve personal empowerment, community engagement and pride and contribute to grassroots democracy. At the end of 2009, Abalimi worked with over 3000 micro farmers, providing training, and assistance with getting micro farm projects established, supplying manure and water and providing marketing assistance.

The case of Abalimi Bezekhaya illustrates graphically some of the key principles that might be sought for the future. It shows how small-scale, low input, locally, organically produced food can bring food security and more. The women, sceptical at first, now say they have never been happier, healthier or had more control over their lives. Their status has risen in the community; before they had been nobodies. Now they have company, other women to work with and talk to, a purpose, and they are contributing to the material basis of their own lives as well as to that of others. They say that now, even the young men in the community want to do what they are doing. It is of note too that, although this urban farm is in the middle of an impoverished, crime-ridden slum, there has been no problem with stealing or destroying produce. Yet there are no fences around the farm.

11.3.2 Transition Towns

Hopkins, founder of the transition town concept and author of *The Transition Town Handbook* (Hopkins 2008: 8) writes that '[c]limate change – an issue of great severity – is only half of the story: developing an understanding of peak oil is similarly essential. Together, these two issues have been referred to as the 'hydrocarbon twins'. He argues that they are so entwined that, seen in isolation, a large part of the story remains untold.

The transition towns movement is based on the premise that peak oil and climate change require that we change how we live and that this can best be

done through communities coming together, examining their use of fossil fuels, and then transitioning to more sustainable lifestyles around localisation, cooperation, organic food production and energy descent into renewable and reduced energy systems. Central to the transition towns' movement is the concept of community resilience. This refers 'to their ability to not collapse at first sight of oil or food shortages and to their ability to respond with adaptability to disturbance' (Hopkins 2008: 49). This means 'being more prepared for a leaner future, more self-reliant, and prioritising the local over the imported' (Hopkins 2008: 50). He maintains there are three keys to resilience. First is diversity of land use, functions, people, cultures and systems; second is modularity which means structures which can more effectively self organise in the event of shocks such as local food or financial systems; and finally, tightness of feedbacks referring to how quickly the consequences of a change in one part of the system is contained and responded to by another, enabling timely responses to events/things, and bringing the consequences of actions closer to home. Hopkins (2008: 43) quotes an example from Vandana Shiva of the villages which recovered best when the 2004 Asian tsunami hit, saying:

it was the villages with the greatest resilience that were up and running relatively quickly, and those that had dismantled their resilient economies in favour of an import-dependent, tourism-based model that were hit the worst. The indigenous tribes of Andaman and Nicobar, the Onger, the Jawaras, the Sentinelese, the Shompen, who live with a light ecological footprint, had the lowest casualties even though, in the Indian subcontinent, they were the closest to the epicentre of the earthquake.

Hopkins' focus is primarily on peak oil as he believes people are less familiar with this issue than with climate change. He recognises that there are many forces arrayed against action to address such issues and that to engage with neighbours in the community on these matters amounts to a considerable challenge to get people to take the big step of reconsidering every aspect of our reliance on cheap oil. He points out that this involves local energy and water self-sufficiency, personal and community transport, housing, food sources,

recreation and leisure, health systems, education, financial matters and how the community deals with emergencies. The changes envisaged are to develop self-reliance and resilience in the face of future oil and climate shocks.

Transitioning recognises that the problem is vast and doing nothing is not an option.

On the premise that the way of life in rich countries is unsustainable, Trainer (1995), author of *The Conserver Society: Alternatives for Sustainability*, in a similar vein, talks about transition societies and what such sustainable societies might look like. He argues that we need to be clear about where we are transitioning to and that we cannot make the transition just by technical means, such as using solar power. As does this thesis, he also emphasises the need for a just global economy. Trainer (1995) maintains that practical and attractive alternatives exist and that we can in fact improve the quality of life for most people not just in the South but also in the North. At the same time he stresses that the transition to an ecologically sustainable and just world must involve huge changes. Trainer's book echoes much of what this thesis has argued as he outlines alternatives available around the design of settlements, housing, energy, food production, the development of a new economy and the shift to new values. He emphasises that the essential principles for sustainability must be more materially-simple living standards and small-scale, self-sufficient local economies. Trainer (1995) provides examples of alternative communities, and offers a strategy for people to begin moving their own localities in that direction.

The concept of transition towns⁷³, however, is not without critics. James in a debate conducted over several issues of *Arena Magazine*, 2009, writes that:

[c]limate change is no small problem that can be averted by small steps: it will take big decisions and a lot of intervention as well as the political

⁷³ I have been involved in initiating a community garden as a preliminary step toward a transition town movement in East Fremantle, an upper middle class area close to the Swan River and Indian Ocean in Western Australia. The aim for many involved in the early stages of establishing the community garden is to create a transition town, to link up with other community gardens/transition towns, so we can illustrate that another way of life is possible.

willingness to change things. The problem with the Transition Movement is that it has a mandate that avoids any political conflict; hence, it is allowed to proliferate and gains the support of governments and local councils, doing nothing to upset the economy or the status quo ... Small steps of like-minded souls who combine vision and will and tenacity and who must choose their own goals and ways of functioning; if the magnitude of the problems were not so great I would be supportive; small steps might be good occupational therapy, alleviating a growing disenchantment, but it will not solve the world's environmental problems.

There are a number of points to consider in evaluating the transformative possibilities of transition towns. Firstly, is the question around whether the proletariat, the workers, are the only true and potentially effective agent of challenge to capital. Holloway (2002, quoted in Desai 2004) argues that for example in South Africa, most resistances to capital are at the point of consumption (that is – of services, water, electricity, housing and so on) rather than production, and are community-driven rather than union driven. A similar situation exists in Australia, although the issues are not about such basic needs as housing, water, electricity, but about wages, conditions and the environment. The most oppressed and alienated people in Australian society - Indigenous people and people impoverished because of mental and physical disabilities - are so marginalised, fragmented and powerless and have internalised inferiority and passivity, that the possibilities of contesting the system are remote. There are very different material factors affecting the possible sites of transformative change in Western industrialised countries, particularly in a country such as Australia where the material realities of the majority of the population place them in the top twenty per cent of the world's income bracket, a historically and radically different location in the global capitalist economy than those struggling for change who are located in the periphery. Even in the face of catastrophic global warming, the historical and material position of people in the global political economy centre is antithetical to radical structural change. The language of global warming protest, of opposition to coal mining, is not, in the main, the language of deep and radical structural change and, furthermore,

the number of people participating in opposition to the *status quo* is comparatively small and fragmented.

We can gain a further insight into the transformational potential of transition towns by returning to a more explicitly Marxist analysis. As Harvey argues (2001), all social activities become absorbed into the processes of capital accumulation, whether they are environmental NGOs, educational institutions or health care. While transition towns and community gardens are operating within the framework of capitalist society, there is an inevitability about their absorption within capitalist accumulation processes. Harvey (2001: 125) writes: 'The accumulation of market niches, of diverse preferences and the promotion of new heterogeneous lifestyles, all occur within the orbit of capital accumulation'.

In the Marxist tradition, James (2009: 18) rightly maintains that '[e]nvironment issues cannot be easily extricated from the system in which they exist: neoliberal capitalism'. She suggests however, that '[s]mall steps will simply divert our attention from the real crimes [and] act like a pause in the political language of environmentalism, ensuring that we interpret the discursive power plays in a more conceptual, friendly and unobtrusive way. It encourages participation on the basis that we do not engage in assertions of political blame or accountability. On the contrary, small steps act like a meditation with a mantra buried in subordination and false consciousness. The whole earth, nature based phenomenon encourages individuals to feel not think' (James 2009: 18). It is difficult to argue against James' viewpoint. Perhaps she is correct, but what are the alternatives? Transition towns do have the potential to exacerbate the social divide unless those involved maintain a sense of international solidarity with other transformative movements and a critical perspective. I would contest James' accusation that the discourses around transition towns are necessarily depoliticised and that this could accentuate the deepening conservatism that is taking hold in Australia and elsewhere. However, this is a risk.

Of course, there are many question marks over how significant any impact the transition towns' movement will have.⁷⁴ It has the undoubted, even if limited, benefits of providing concrete examples of the fact that other ways are possible; it brings people together in what is otherwise a very atomised individualised society; it involves people working to produce food in ways that break down some elements of alienation and which have the potential to make people more connected to the soil and the ecology, learning the principles of soil care, water conservation, the importance of bees, insects, earthworms and so on, facts of life that have been largely lost in Western industrialised societies. It also involves sharing and building community relationships. Will the transition towns' movement spread sufficiently to make a dent in growth, capital accumulation and consumerism? It is unlikely unless the movement is linked to struggles to change the political and economic basis of society. Nevertheless, given the ideological and cultural hegemony of capitalism, if this movement helps to create even a crack in the dominant ideology and the existing social relations and consumerism, it is a start, with people making changes and becoming, in the process, more critically aware about the world around them. We need as a minimum to find spaces in which to build alternatives to global capitalism. Again to quote Harvey (2001: 411) we need to search for spaces in the hope to find '[o]ne in which the progressive forces of culture appropriate those of capital rather than the other way round'.

We have a very short timeframe in which to act and a moral imperative which says to do nothing is not an option. The question of a socialist government through the ballot box, through revolution or armed struggle in Australia, or in any part of the rich industrialised world, is a non starter; so, if not transition towns, I would ask James (2009), where do we start? The trade union movement in the main in Australia and many other parts of the developed world, is deeply conservative in relation to the environment, global warming, and for some, even with respect to such issues as the proposed mining company super-profits tax. The left wing leadership of the trade union movement so evident during the 1970s and early 1980s on many international,

⁷⁴ In Australia at the moment there are few alternatives beyond voting for the Greens (a limited alternative) or Socialist minority parties in elections and voting once every few years hardly constitutes active participation in change processes.

social justice and environmental issues seems to have largely disappeared, in part as a result of neoliberalism. Whatever the reason, the strength and progressiveness of the trade union movement has declined.

11.4 Cuba

The changes that are going to be needed to move to the post capitalist societies envisioned in Chapter 12 will be both radical and traumatic. Cuba is a rare case which illustrates the creation of an ecologically more sustainable type of society, the critical factors being that it has broken away from the capitalist social relations of production, dramatically reduced its use of fossil fuels, adopted ecological agricultural practices, localised food production, built a significantly more equitable society and has adopted many ecologically regenerative practices. Other radical changes, but of a different type, have occurred elsewhere but have often been very painful. Thus, for example, in the old Soviet Union, close examination of the major transformation from a communist, state-controlled economy to a free market economy raises some critical issues about such very different social change but are nonetheless relevant to changes that should and could occur in the wake of global warming. The process of transformation in the Soviet Union became an opportunity for capital accumulation and dispossession on a grand scale, with formerly state-owned assets being sold at bargain prices to former party apparatchiks and other elite, enabling them to form the very wealthy and powerful Russian oligarchy of today. What is particularly relevant in the context of this thesis is that there were no culturally relevant institutions or detailed and clearly enunciated principles put in place to transform to and to protect the interests of the people. The institutions that were set up were in essence imported from the West or thrust upon what became Russia by the West. What this suggests, as I have indicated, if the situation were to arise in the future, and not just in Russia, is that there is a clear need to have in place the relevant principles and institutions to ensure that any new economy is able to be built in a way which reflects these principles. (I return to this issue in the next chapter.)

Returning more specifically to Cuba, there are many problems with that society, several of which it could be argued arise as a result of the forced isolation of the island and its economy, for example through the US trade embargo. It is however unique in that the egalitarian political economic structure is strongly embedded in both state and local community. The transition to local, low-level benign technologies, urban (and rural) agriculture, local and organic food-growing practices is only one (but an important) part of Cuba's transformation. At the heart of the economy are its socialist structure and principles of production for people's needs rather than profit, and its resistance (to date) to capitalist economics. The problems faced by Cuba can be put into some better perspective if one compares Cuba with its near neighbour Haiti (Clarke, 2003) which has been embraced by the neoliberal development model and the patrimony of the United States and until very recently had a very high per capita national debt (some of it now forgiven – perhaps too late – in the wake of the earthquake in early 2010).

The political economy of Cuba is illustrative of several relevant dimensions of future societies and economies. First I will give a brief over-view to put that political economy in its historical context.

First, Cuba underwent a radical and rapid transition from a capitalist economy, described as a vast sugar plantation (Raby 2009: 1), to one overseen by a pre-socialist democratic liberation government from 1959 to 1963, before then becoming a socialist country in the mid 1960s. The economic changes were structural and profound. The truly revolutionary changes took place during the period 1959–61 on the basis of calls for democracy, anti-imperialism and social justice. In a sense these were not unlike the anti-globalisation and anti-capitalist movements at a global level in the period from the 1990s until now. Second, Cuban democracy is based on local communities with neighbourhoods and workplaces engaging people in decision making that directly affects their lives and livelihoods. Third, the country has faced the longest US trade and travel embargo in history, from 1962 until now. For a number of reasons this point is relevant to the creation of new transformative economic models. It illustrates how countries, even with very severe constraints on its resources,

can survive and become resilient in a way that is relevant to the new world economics that global warming and peak oil demand. Cuba did not just survive; it developed and maintained free universal health care and education, it subsidised rates for housing and utilities, and it increased sites for democratic consultation with the broad mass of the population, bringing them on board in facing the many difficulties and crises experienced since the early 1960s. In so doing, it retained the support and commitment of the population, despite the many hardships faced, particularly during the economic crisis which came about with the collapse of the Soviet Union from whom Cuba had received considerable support in aid.

Fourth, from the Cuban experience, we can get some sense of the importance of ideology, in the context of both social change and social cohesiveness. Cuba also demonstrates the significance of the Gramscian argument that, for Marxism to be successful, the ideas need first to become hegemonic, that is, in this context to become common sense (Raby 2009). While the 1950s' Cuban revolutionaries were influenced by Marxism, they nonetheless remained independent of the international communist movement, thereby retaining a degree of flexibility that 'was crucial to their success' (Raby 2009: 4). Cuba thus built institutions, particularly using the community as a central institution, that were fundamentally and culturally Cuban in nature and identity. The Cuban revolution drew on its own internal experiences of national political and economic corruption, exploitation, repression and domination by the US government. So in January 1959, Fidel Castro claimed that while the war of independence had been won, the revolution was still to be carried out. Certainly there had been a popular victory by the mass of the Cuban population with Castro stating that 'the revolution is as Cuban as the palm trees' and 'many people have not yet realized the scope of the change which has occurred in our country' (quoted in Raby 2009: 4 from the Cuban periodical *Revolución*). There had been no reference to socialism, class struggle or Marxism and, according to Raby, what ideology there was, was seen as being in the interests of the people, for the good of all, to agrarian reform and to defeating the monopolistic and powerful interests of the large land/plantation owners. Thus the basis of the Cuban revolution was not socialist *per se* but

grew out of the strength of popular support for self-determination and social justice, backed by its consensual and inclusive character and the particular historical materialist situation in Cuba. It was not achieved on the basis of some abstract or explicit Marxist theory. As Raby (2009) maintains, it was only in the 1960s at a certain point in the transformation process that it was identified as socialist. The key points of relevance to this thesis and the future economy are the importance of the motivation; the coherence between the ideology and the reality of people's lived experience; the use of the community as a central institution built on Cuban values; and the fact that, if it is in the people's interest and becomes the people's will, radical transformative change is possible within a relatively short time.

Fifth, Cuba today is an example of a socialist society which has attained a high level of stability, equity, education, health status, grass-roots democracy and economic independence and this despite the enormous pressures from its near neighbour and bastion of neoliberalism, the United States. In spite of its isolation from the global economy, Cuba's emphasis on egalitarianism, education and health care has resulted in its human development indices being on a par with the world's most economically powerful nation. It has a Human Development Index (HDI) of 0.863 which gives it a ranking of 51 out of 182 countries.⁷⁵

Sixth, in transforming its economy from a fossil fuelled industrial plantation-based economy into an ecological, diversified, organic food-producing, self-sufficient economy, Cuba has not only been able to improve significantly the quality of physical life of its citizens, it appears to have built a socially cohesive society.

⁷⁵ Cuba has human development indicators on a par with the most developed democracies in the world – with the exception of income. It has a per capita GDP of \$US6,876 PPP; a 99.8% literacy rate; and a life expectancy at birth of 78.5 years. This compares with the United States which has a HDI of 0.956 and ranks 13th out of 182 countries; a GDP per capita of \$US45,592 PPP; a 98% literacy rate; and a life expectancy at birth of 79.1 years. Cuba has one of the most highly skilled workforces in the world (Ranis and Kosack 2004) and 'exports' thousands of doctors as a form of aid to Third World countries (19,000 physicians alone in 2008 – more than all the G8 countries combined) as well as training Third World doctors in their own countries (Direct Action 2009). http://directaction.org.au/issue8/cuban_revolution_50_years_of_accomplishments Accessed March 2011.

There are many lessons here for the type of transformational change that neoliberal countries will need to undergo if we are to save the planet for human occupation. Much of the trade, aid and oil for Cuba came from the Soviet Union until it collapsed in 1989-90. This meant that thereafter Cuba's development had to be based on its own natural and population resources. For example, with the demise of the Soviet Union, imports of oil to Cuba were cut by more than half and of food by 80 per cent. The film '*Power of Community*' (Morgan 2006) shows how Cuba went from having a highly mechanised, industrial agricultural system to one using organic methods of farming and local, urban gardens, building a resilient, locally based economy. The country made a fundamental change to organic agriculture and adopted ecologically sound practices throughout the economy. It developed a system of *organoponkos*, intensive cultivation of fruit and vegetables and an extensive urban organic agriculture system. Today, Havana, the capital, produces within the city, 60 per cent of its fruit and vegetables, a scheme that is now being adopted in a number of other South American countries (Morgan 2006). Cuba of necessity, underwent an energy revolution with the demise of the Soviet Union, and has now a system of decentralised power generation where communities depend more on small but efficient local generators. More recently Cuba has invested significantly in wind and solar power generation.

Seventh, Cuba is one of the few countries which has been increasing its biomass, has not been involved in depleting other countries' biomass and has the record of being the only country which has increased its forested land area. It is the only country in the world to meet the World Wildlife Fund's (2006) criteria for sustainable development.

In making an overall assessment of the Cuban experience, perhaps the main lesson for future post-capitalist economies is that when change to local, community-based production is necessary or is forced on a country, Cuba tells us that it *can* be done. Cuba also provides one example of *how* it can be done. Leadership, resilience, a community-focus, culturally relevant institutions, belief in a principle (justice) and an imperative to survive – there really was no alternative – were essential ingredients of the Cuban success. Importantly, the

very basis of society was transformed from being divided, hierarchical and unequal to one where the social relations of production were socialised and large scale land reform was carried out. Urban agriculture has played an important role in providing the population with food security and involvement in the nation's transition. There will be many routes to the future post-capitalist world but the odds have to be high that all successful roads will involve these characteristics.

11.5 Conclusion

Over the last four centuries or so, capitalism has transformed the face of the earth to the point that we are now confronted with a planet that may not much longer be able to support human life as we know it. Despite this, the capitalist system is still set to engulf the last remaining corners of the planet, all but guaranteeing widespread human and ecological catastrophe. This trajectory has been examined in the thesis through the perspective of the political economy of global warming but, as has been made clear from the very beginning of this thesis, global warming is but one product of a system which has many crises and contradictions, is unjust, unstable and destructive and where the manifestations of these characteristics are many. As Harvey (2001: 121) suggests: 'someone, somewhere has to think about what kind of social system should replace it'.

This chapter has attempted to make a contribution to addressing Harvey's suggestion, by considering a few examples that might point the way. The next chapter seeks to address Harvey's point more explicitly, but still at the level of setting a constitution rather than specific guidelines. It has sought to show that stable and just societies can be built around the institution of the community.

CHAPTER 12 Principles for future societies

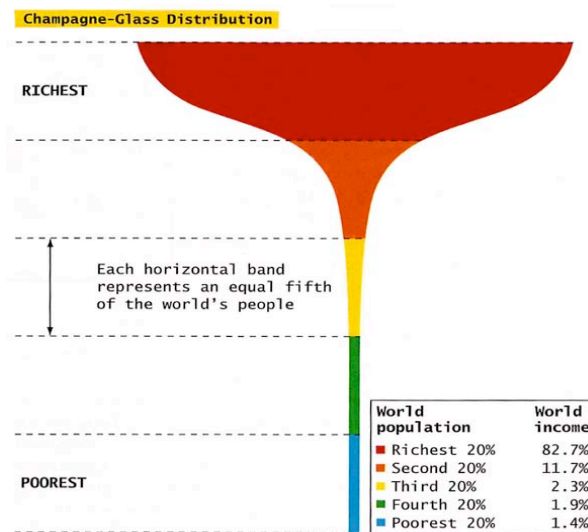
12.1 Introduction

The focus of this chapter is on what sorts of societies will best address global warming. It has been argued throughout the thesis that global warming is but one of a suite of interrelated issues and that we need to address the structural causes of the whole gamut of problems that constitute a convergence of crises that have been called the ‘crises of civilisation’. What sorts of societies can we build that might resolve these crises, especially of global warming? What are the key principles and values, structures and institutions for such societies? We need to be clear about where we want to go before we set out on the journey, and then have some idea of how we are going to get there. This chapter will suggest some major considerations in building theories and societies for the future, developing these ideas in part from the considerations set out in parts II and II of the thesis. I use the plural ‘societies’ for, as I will argue, diversity and localisation are key principles for any future societies. Attempting to devise alternatives to neoliberalism and capitalism more broadly is a challenging task. As previously discussed at various stages of the thesis, the whole orientation of contemporary capitalist society has effectively sought to delegitimise such possibilities. There is however, as never before, an urgent need for alternative visions, perhaps even for utopian visions, or what Chomsky (2010: 309) calls a ‘rekindling [of] the radical imagination’ for humanity. The capitalist system is filled with too many contradictions and has given rise to too many crises – not the least of which is global warming - for it to continue.

Chapter 11 has provided some practical guidance from some existing examples both micro and macro, regarding what sorts of principles we might want to underpin these new societies of the future. Particularly in the West, there is little institutional appreciation of the non-material accumulation concepts of development or that, beyond a certain point in material wealth, more goods do not necessarily equate with better, happier or more developed lives (Hamilton 2003). As argued earlier in the thesis, there is little acknowledgement of the historical processes which have given rise to the ‘champagne glass’ model of

global wealth distribution (see Figure 12.2 below); or that the vast majority of the planet's resources are owned, controlled and exploited for the narrow ends of a few; or that the issues of inequality and the exploitation of labour are key factors in finding solutions to global warming. Nor is there a sense of transformative or revolutionary change. In the few pockets where (in the West) a sense of the need for change does exist, it is captured in large part by the various factions of largely marginalised socialist politics. In Central and South America and India, there are small-scale farmers' movements, such as the Latin American *Movimiento Campesino a Campesino*, members of the World Social Forum, Bolivia's Mother Earth and Indigenous groups calling for structural change to the global economy. In Africa, there are many anti-capitalist movements and groups working for democratic change. The 2011 events in North Africa and the Middle East reveal the extent of the desire for radical change. The strength, pervasiveness and in a sense 'solidarity' of the power of the world's rich, however, maintain the *status quo* globally. This power not only includes the hegemonic ideology but also (in the West) structural ties such as superannuation, pension funds and share ownership (albeit minority shareholdings) that support the capital accumulation process and capture the communities' interests in the capitalist system, but do nothing for the redistribution of wealth or power or for laying the groundwork for sustainable futures. This is not fertile ground for deep and radical change. Further, we in the West too easily distance ourselves from what is happening in the South and have an almost pathological disassociation from what global warming really means in terms of the material and structural changes required.

Figure 12.1 The Champagne-glass Distribution of Global Wealth (Source: Conley 2008: 392)



This chapter is structured around six main themes and draws in part at least from the examples presented in Chapter 11. Beyond this introduction, section 12.2 outlines the different world-views that will be required in future. The constraints that future societies face are outlined in 12.3. Acknowledgement of these constraints is important not only to avert global warming but to establish a realistic basis for what is available to meet the material needs of future societies. The question of institutions for the future is discussed in 12.4. Section 12.5 outlines the key principles and values that must underpin future societies if they are to sustain life on the planet while 12.6 suggests some research questions to help us to progress . The conclusion follows.

12.2 Different world-views

To have a future, humans need to become critically conscientised regarding the hegemony of neoliberal ideology and the alienation of human lives as a result of the capitalist system and face up to the reality of the interconnected crises of civilisation. Thereafter human societies need to reconnect with the living planet through our cultures and the social relations of production. People's behaviours are located within structural and ideological frameworks which mean that, alongside the transformation of the economic structures, new cultures and forms of human expression and satisfaction need to be developed. Future

societies need to give more emphasis to the intrinsic and inalienable qualities of health, happiness and connection through community which are singularly missing for example in today's South Africa (and the west generally). Related, rather than the extrinsic material values fostered through over-production and consumption, there will need to be a re-establishment of life-enhancing values. A central tenet of the relationship between humans and the broad ecology, as prescribed by Marx, is that a condition of sustainability is that it is the responsibility of all peoples and societies on behalf of all generations to come to care for the maintenance of the planet (Foster and Clark 2009). The modern world under capitalism has lost its connection and sense of place in the broad ecology – to the land, water, animals and plants – and the metabolic systems supporting life on Earth. There needs to be a healing of the metabolic rift.

The epistemologies and values of future societies can learn much from the wisdom and worldviews of Indigenous cultures. These see that everything that has been created and given to us in nature is precious and is governed by divine laws. Their conceptualisation of humans as custodians, caring for nature and seeing nature as sacred and central to all wellbeing, calls out to be emulated. For the Hopi Indians, for example, the Indigenous peoples of the world are the caretakers of life and, as with many Indigenous societies, believe humans 'are to protect and use all these precious things wisely, and to share them in order to keep harmony among all people' (Knudtson and Suzuki 1992: 190).

This is not to argue for future societies to adopt Indigenous culture. That is not possible. It is rather simply to point to the fact that future societies can learn from Indigenous culture the values of custodianship of the land and with that the communitarianism of that culture in respecting the value of community not only of people but of the broad ecology more generally. Future societies need to adopt new cultures only to the extent that either the acting out of their existing cultures cannot be maintained in a globally warming world or these cultures continue to embrace the neoliberal values of individualism and acquisitiveness (so apparent in the new Black elite in South Africa and which get in the way of the development of the future societies as identified later in this chapter). I am hesitant to try to predict how difficult it will be to bring

about these necessary cultural changes, but take heart from the example in Chapter 11 that it is possible.

Given the many crises of capitalism, there is now an imperative to develop a shared vision which embraces all humans more justly and equitably. To get from where we are now to that shared vision, however, is a great leap, not least because of the enormous power wielded by the global elite, the beneficiaries of the current system and the pervasiveness of the neoliberal ideology.

In the context of spelling out the key differences between today's economic neoliberal system and that of the future, highly relevant is the Lauderdale Paradox (Foster and Clark 2009). Lauderdale revealed the contradiction of the inverse correlation between public wealth and private riches, 'such that an increase in the latter often served to diminish the former' (Foster and Clark 2009: np). This paradox starts from the fact that market economists treat nature's contribution to wealth as zero. Hence the destruction of nature does not register. Foster and Clark (2009) argue that, behind this paradox, is the fact that neoclassical economics fails to recognise the distinction between the value in use and the value in exchange. As John Stuart Mill (1909) suggested, in economics 'the word value always means value in exchange. The use of a thing [in economics] means its capacity to satisfy a desire or serve a purpose.'

Now while one can see the logic in this, it means that certain resources which clearly have value in use (such as air) end up with zero value or at least lower values when seen in terms of their value in the market place. Something which is not a commodity, which is not exchanged in the market, has no value. This has major implications for planetary destruction as many of the resources that are not traded in the market place have value ecologically (the biomass for example) and even some which are traded in the market do not have their full use value attached to them.

The paradox lies in the fact that increases in scarcity, in such necessary elements of life as air, water, and food, would, if privatised and hence have exchange values attached to them, enhance individual private riches, and

indeed the riches of a country, but only at the expense of the common wealth. For example, if one could commodify water that had previously been available free by placing a fee on wells, measured riches of a nation would be increased but at the expense of the growing thirst of the population.

There is much more to the changes needed in economies and in economic thinking than is exemplified in the Lauderdale Paradox. However it exposes what is a key element here. The issues here are not just about technical questions. They are much more fundamentally about what ideology and what worldview one adopts.

Transformational change will not be possible while people remain locked into the capitalist paradigm where their world-views are in large part formed by the consumption-focussed knowledge industry⁷⁶. It is of note however that some studies have found that critically informed citizens (and in the context in which this issue is raised here being critically informed is crucial), even those in the West who are the beneficiaries of the system, respond to questions around social issues and the allocation of resources in just and compassionate ways. In doing so, citizens draw on values of community solidarity and wellbeing and preferential support for the most marginalised or impoverished (Mooney 2009). Yet this is not how people vote in Western democracies.⁷⁷ Much of the appeal in Western democratic elections is short term and within narrowly defined personal, private and nationalistic interests with voters voting as relatively uninformed individuals rather than critically informed members of the community. In a global warming world, the potential through the ballot box is there to lead to the politics of survival of the most powerful and with no or little concern for the longer term or the majority or for the planet.

Paulo Freire (1970) provides useful insights in building transformative social relations. For example he is critical of the 'banking concept of education', that

⁷⁶ The knowledge industry refers to the media, including the advertising industry, but also all the institutions which are associated with education that perpetuates the *status quo*, that is not critical and analytical of the *status quo*.

⁷⁷ See for example for Australia, Kitney 2004.

is, education which is uncritical and indoctrinating, is fundamentally oppressive of people's liberation and serves to maintain the unjust and inequitable *status quo*. Freire (1970: 85) advocates instead critical education which enables a deepened consciousness of people's situations and a 'historical reality susceptible to transformation'. He argues for the building of critical tools to enable the transformation of societies. Drawing on Marxist theory, Freire's liberation theology work was developed in the context of the poor and oppressed during the 1950s and 1960s in Latin America and one could argue that it has no potential for resonance in middle class Australia or North America. I would propose that particularly given the problems arising from global warming, growing numbers of refugees, food and water crises, and the many other problems that are going to intersect in the foreseeable future, the building of critically conscientised societies is much needed. That in itself can assist in reducing alienation. If one combines the work of Freire, with the studies of Mooney (2010), then for many in the West, social transformation based on the principles of critical awareness, equality, justice, compassion and community, has the potential for creating a coming together of humanity – reducing the problems of individualism - based on community participation, engagement in decision making processes and critical thought.

Furthermore, Freire's work revolves around the moral and philosophical question of what it means to be human. By actively engaging in the collective liberation of all, we are also engaged in a process of liberating ourselves and fulfilling our potential as moral, ethical, empowered and history-making human actors, collectively working to transform our society to one that is enduring and rich in social and cultural diversity. This is the pathway to making ourselves more fully human and, at the same time, better equipped to live in a state of connection and harmony with our fellow species and the broad ecology. As part of this, leadership must be a part of the community, rooted in and subject to the same experiences as the community and dependent on the same ecological constraints as the community from which it develops. It must include critical dialogue and communion with the people it represents.

This factor alone helps to define the limits to the size of community. The socialist revolutions of the 20th century failed in part because the physical or geographical scale of revolutionary action was defined by the state rather than the community. They replaced one distant state with another. Further the process of change was violent. These repressive transformational methods are both unacceptable and risky in the 21st century. They will also fail.

12.3 Constraints for future societies

Part I of the thesis discussed some of the biological constraints to human activities if we are to maintain the planet's biosphere as being fit for the lives of humans and other species. To recap: We need to reduce carbon dioxide in the atmosphere to 350 ppm CO₂ as a matter of urgency, and then more gradually reduce further to 280–300 ppm CO₂. Currently we are heading for 390 ppm CO₂. Scientists argue that 350 ppm is the safe upper limit and that we need to get back to pre-industrial levels, 280 ppm, to return the planet to a state conducive to the development of human societies.

Beyond this, there must also be recognition of the limited remaining capacity of the atmosphere to act as a sink for carbon emissions and that we have, at most, 10 years to pull back from the brink. This then raises the really difficult question of who should be allowed what share in this sink. This is a resource that should be used for only essential human activities, the most crucial being the transformation of the current relations of production. The global political and economic elite cannot continue to have such a big per capita share of the global atmospheric commons. Equity demands a transfer globally of resources from those who pollute, and have historically polluted more, to those who have polluted and who do pollute less. This transfer however has to be on the condition that those resources are used to minimise growth in emissions as those poorer countries develop their own economies. This should form the centrepiece of relations between North and South. These issues of reduction and redistribution need to be considered and acted upon within a clearly defined target of 280-300 ppm.

There are a range of multi-faceted constraints that need to be considered with respect to future societies in addition to carbon emissions. I will discuss four of these constraints now.

The first is in relation to the biocapacity of the planet in general. Wackernagel *et al.* (1995) introduced both a significant baseline for conceptualising the Earth's biocapacity and a metric for measuring it. These authors established that the planet had a total of 13.2 billion global hectares (gha) of biocapacity. This represents its ability to produce and reproduce the biological conditions for life on the planet. For a population of 6.3 billion inhabitants, this equates to approximately 2.1 gha per capita, but clearly less as population grows. Trying to operationalise this baseline in some way or other would be highly complex, but conceptually it performs three important roles. First it graphically illustrates just how little room there is in the biosphere to provide for each person's needs, while also providing space for other species. Second, it provides a clear guideline for the use of the Earth's resources (compared to the current system which is based on continual growth of the economy), and hence use of the Earth's bioresources. Third, if one accepts the principle of equity, it places clear limitations on what each person and community can consume of the biosphere.

It follows that the main focus of future societies will involve developing economic and political systems which provide access to what will be a heavily constrained but equitable ecological footprint. This consideration will need to over-ride all others. Every human being should have a right to their share of the Earth's biomass, but no more. To exceed one's footprint entitlement is both to rob another of theirs and to endanger the sustainability of the planet.

The champagne glass (Figure 12.2) graphically illustrates the extremely unequal distribution of wealth currently, and hence access to the Earth's biocapacity. The richest 20 per cent, who also have the greatest capacity for change, are those with the least desire for change and with the greatest power to resist change. They continue to suck up resources from the bottom 80 per cent, through land acquisition, through mining and other resources extraction,

through capital flows and the financialisation of the economy and, most importantly, through establishing the international rules for the governance of the global economy (Conley 2008: 392). The top 20 per cent represent the vision of where the development of human societies is leading to, although there is no apparent ceiling to this vision. Currently, in the international debates about global warming, the top 20 per cent want to impose restrictions on the bottom 80 per cent, while at the same time continuing their own increasing production and consumption patterns (and carbon emissions). As was illustrated in the study of South Africa, not all elites live in the North; most countries have their high consumption elites, and the model of development being imported to the South, in collusion with southern elites, is one that perpetuates this champagne glass distribution of wealth and power.

A second constraint, the peaking of fossil fuels, will have an enormous impact on the organisation of future economies and societies. According to the work of the Association for the Study of Peak Oil and Gas (ASPO)⁷⁸ (and as raised briefly previously in section 10.4), the peaking dates for fossil fuels are oil 2010; coal 2010; and gas 2030.

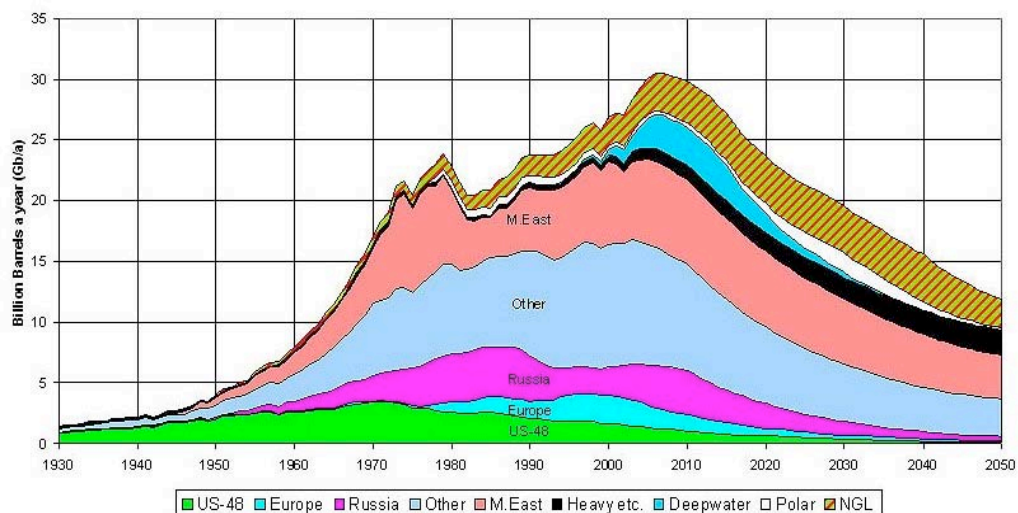
To illustrate the significance of this peaking, let me look more closely at ‘peak oil’. While there is some confusion surrounding the meaning of this term, most frequently it refers to the point at which oil production is at a maximum. It has implied within it that thereafter there is a decline in production, instead of continuing to rise steadily as it has done over the past 100 years. Relevant here is the world oil depletion curve (Figure 12.3 on page 229). This is based on known oil reserves plus best estimates of the amounts yet-to-be-found (clearly a less than precise figure). This curve indicates that world oil production reached a peak (87 million barrels per day) in 2010 and is now in decline (Alekklett 2010). The part before 2007 is historical fact. The part that comes afterward is an ASPO extrapolation. The detail of what will now happen is largely ‘unchartered territory’ (Hopkins 2008) but the ‘downward curve’ does

⁷⁸ Alekklett (2010) public lecture, Perth 16 December.

mean that the amount of energy required to extract any fixed amount of oil is now rising and the extraction process increasingly environmentally risky.

While the curve does not show the amount of energy being used to extract the declining amounts of oil, for example, there is a relationship known as ‘energy return on energy invested’ (EROEI) and it is changing. For example, in the US in the 1930s, the EROEI was 100:1; today globally it is somewhere between 11:1 and 18:1. Also, in considering alternatives, it is worth noting that the EROEI for wind is 11:1, for photo-voltaics between 2.5:1 and 4.3:1; for hydro 23:1; and for biodiesel about 2:1 (Hopkins 2008: 45). Trainer (2007) argues that while renewables will have a key role to play in future energy needs, the idea that consumer (capitalist) society can be powered entirely by renewables is absurd. Future societies will need to be organised to depend on much less energy. Hence the idea of energy descent which is described by Hopkins (2008: 45) as ‘[t]he continual decline in net energy supporting humanity ... It also refers to a future scenario in which humanity has successfully adapted to declining net fossil fuel energy availability and has become more localised and self-reliant.’

Figure 12.2 **World Oil Depletion Curve**



Source: <http://planetforlife.com/oilcrisis/oilpeak.html>. Accessed March 2011.

Behind peak oil and energy descent lies a third constraint, the imperative for de-industrialisation. Heinberg (2007: 55) describes this in the context of agriculture as '[a] radical reduction of fossil fuel inputs to agriculture, accompanied by an increase in labour inputs and a reduction in transport, with production being devoted primarily for local consumption'. Fossil fuel depletion almost ensures that this will happen. De-industrialisation, however, will of course need to occur across all economic sectors, with production being planned and directed initially toward the transition phase (to localised, non fossil-fuelled economic activity) and thereafter only for the production of essential items.

A final constraint relates to the biological needs of humans for healthy survival. One measure of this is the number of calories required by humans per capita per day. Today, the average per capita consumption of food has increased to 2,760 kilocalories per day, but that average masks significant differences, from millions of obese people to one billion humans who lack access to adequate food (Pretty 2009). Whatever, humans require a basic and measurable number of calories per day to remain healthy.

12.4 The community as an institution

It was identified in the theoretical section (Part III), and is confirmed in the examples in Chapter 11, that the key institution for the future will be the local and regional, critically conscientised community. This issue of community is crucial as it sits at the centre of the new economics and the new societies. Power and decision making must be rooted in the material realities of people producing their livelihoods within the context of local geographical communities. This will ensure leaders are not alienated from the communities which they represent because their material interests will remain the same as those of others in their communities. Their knowledge and influence will be dependent on the strength of their connection to their community and the degree of trust in which the community holds them. There is no future for global elites and no material basis for people to become elites. Just as

contemporary global power relations have led to the invisibility of most of humanity, in a transformed future, the great mass of people will be the history makers, the key actors and the stage will be local communities and regions.

The concept of community has many historical homes, including from Indigenous epistemology, to Indian political philosophies, to Western communitarianism. I refer to community as being geographically localised, consisting of politically, economically and socially linked groups of people who are connected through the production of their livelihoods, their inter-dependent social relations and cultures. Such communities may be intentional, that is, where people have chosen to work together in pursuit of a common ideal or vision or have historical roots. They may be urban or rural, but in either case, they have a strong and inter-dependent economy and relationship to the local environment. In localised economies, people require greater autonomy on two fronts. 'Their livelihood and lives themselves are critically dependent on the local resource base' and 'they must have primary control over those resources' (Kothari and Parajuli 2004: 235). In this way, communities have a vested interest in looking after and building knowledge of their local environments as they have to produce their livelihoods and sustain their lives from that environment. In a fossil-fuel constrained world, communities will have to turn to their own resources for not only their sustenance, but for their culture, their identity, their education and their healthcare, and for their rest and recreation. The community will of necessity be central to people's lives.

The intent here is that each member ought to be able to participate meaningfully in the material matters which affect their living. For such communitarian democracy to have the chance to work, citizens need to be critically educated and informed - in the sense of Freire's (1970) critical pedagogy - and know that their engagement is meaningful and built on principles of responsibility, reciprocity, sharing and co-operation. Regional, national and international governance bodies will need to remain rooted in local communities and based on the same principles of custodianship of the planet, of responsibility to others, cooperation and sharing.

The economist Dasgupta (2010:np), whom I referred to earlier in section 9.2 as recognising that nature's resources should not be treated as free gifts, also emphasises the importance of communities for the future. He sees this in the contexts of trust, sustainability and social capital. He writes that all accounts of social capital, and in turn it seems sustainability, must 'rely on social capital occur[ring] somewhere between the individual and the State: they are conducted within *communities*'. He continues: 'For some time now it has seemed to me that in tracking social capital, the most fruitful first step isn't to ask what that object might be, but to ask instead a question that is faced by any group of people who have agreed on a joint course of action: *under what contexts can they be sanguine that the promises they have made to one another are credible?* The question suggests that the fundamental problem facing people who would like to transact with one another is one of trust.' He continues: 'if the idea of social capital is to serve a useful purpose in economics, it should be interpreted as interpersonal networks where members develop and maintain trust in one another to keep their promises by the device of "mutual enforcement" of agreements.'

The italics here are in the original. They reflect my view of the centrality of community for the future. It is noteworthy that Dasgupta here also signals, in his comments about 'interpersonal networks', 'trust' and 'mutual enforcement', the need for what amounts to some set of principles to underpin society. While different, these in a sense echo, in spirit at least, those developed in section 12.5 below.

Building on the primacy of communities as the centres of power, participation and economic activity, future societies will be based on the principles of a localised socialism – that is, common ownership and cooperative management of the means of production and the allocation of resources valued according to their use values (as discussed above in section 12.2). There are a number of reasons for localisation. As indicated, the early part of the 21st century is witnessing the peaking of the production of all fossil fuels which are the energy sources for *inter alia* the current powering of long distance travel, trade and

industry. Metabolically restorative practices require localised production, consumption and waste recycling. Again, the community is the social basis for the economy; for humans' interactions with the environment to produce their livelihoods; for de-alienating society; and for involving people in the common stewardship of the land.

Capitalism will not deliver these. Only by building an alternative political economy, based around the community, will societies be able to cope with this dismantling. It follows that 'the state versus the community' is an important site for discussion around the nature of future societies. In Chapter 9, I presented a Marxist interpretation of the state as the institution which protected the interests of capital. The corporatisation of the state and the conjuncture of interests of corporate capitalism and the nation state have called into question the value of maintaining the state as a structure in future societies. The alternative institution is the community.

Kothari and Parajuli (2004: 234) write of the need to 're-demarcate communities in terms of ecological bio-regions, cultural boundaries and access and control over productive resources'. Urbanised people will need to relearn their dependence on the land and environment and how to nurture and care for them. Especially relevant here is Gandhi's understanding of the relationship of humans to the environment and his idea that the 'logic of self reliance is the logic of place, people and resources bound into locally sustaining ecological systems' (Fattal 2006: np). In this Gandhi showed great foresight in not only his non-violent opposition to colonialism but his support for development processes which focused on the village community and on the maintenance of technologies used by, and which were culturally appropriate for, villagers and rural people.

Gandhi's philosophy has much to offer in designing a future society faced with global warming. The Indian writer Ramchandra Guha (1990) outlined the deeply ecological and deliberately political agrarian environmentalism and prescience of Gandhi. The political programme of Gandhian agrarianism was 'to resist the onslaught of commercialism and industrialism where they have

not yet made inroads, and where they have to resolutely turn one's back on modern society and go back to the land' (Guha 1990: 434). Guha (1990: 236) in turn argues for 'greater autonomy for each community with at the same time, linkages among communities, watersheds, bio-regions and nations'. He suggests that there is a need for 'a framework in which each community can exercise enough autonomy to build its internal solidarity and find some common definition of mutual rights, responsibilities and obligations' (Guha 1990: 236). By neighbouring communities sharing different attributes – forests, water, soil for example - alliances for mutual benefit and local interdependence are created.

It is of note that Guha's prescription is for communities in a nation (i.e. India) that currently has in excess of one billion people. It is one that has been dominated by village life until recently when trends toward urbanisation and industrialisation, the expansion of urban slums and the consolidation of inequality have occurred. This very sub-continent which will be most gravely affected by global warming is thus currently weakening its adaptive capacities in favour of industrialisation, corporatisation, urbanisation and growth.

It is to be noted that the state and representative democracy have been developed within the narrative of capitalism. As Wright argues (2010: 281) 'representative democracy has been one of the critical sources of social stability in developed capitalism'. However, critically conscientised communities have the potential 'to lead a subterranean, potentially subversive life. Communities have eminent possibilities of being the site of resistance to capitalist re-colonization' (Kothari and Parjuli 2004: 235). This is an important principle to recognise in the transformation of society as to where the seat of power for transformation rests.

With the community as the centrepiece of future societies, the most marginalised social actors under capitalism come to the fore in the political arena. The community becomes the site of political decision making, of what to produce, with whom to trade, how resources are allocated, what sort of education the community needs to provide for its members and what sort of

health care. In societies with very limited material resources, there is no room for ecologically destructive practices, for externalising costs and pollution. The community has to absorb all of its costs of production; it has to deal with its own wastes. They cannot be shipped off to foreign shores or into ecological commons such as the atmosphere. In this world, everyone is closer to nature, for even the teacher or the doctor who exchanges their skills for food, water and housing, depends very closely on the health of the local ecology to ensure adequate sources of food, water and shelter. Development in this context is matched to and driven by local needs; it builds local solidarity and interdependence. It is measured by the health and vitality of the community. Ecological regeneration and care are integral to development, for that is recognised as the basis of the community's wellbeing. Such ecologically grounded development does not have the aura of prestige, of success, power and modernity that large scale industrial development projects have. It does not depend on credit or capital investment, but on a sense of community, co-operation and communal decision making. The producers and owners of this localised development are the local community. The beneficiaries of this localised development are the local communities. It is the local community which, through having the responsibility for the good use of resources for development as well as the fruits of development, can then build a sense of pride, engagement and belonging. The local community has power and control over the community and their own lives. Everyone is employed or engaged or has a role to play, including the children, teenagers and the elderly. There is no retirement in such communities. Rather, over the whole life cycle the principle applies of from each according to their abilities, to each according to their needs. The very young, the sick, the disabled and frail are taken care of by the community in the community. Again, they cannot be 'shipped off' to be taken care of elsewhere.

The community makes provisions for the future, for failed harvests, floods, droughts and for difficult times by setting aside food, water and other resources. The community is responsible for building and recovering its ecological commons, its forests, parklands, endemic wildlife species and water resources and in turn for building resilience. Living close to the land and

environment, to the means of production and being intimately engaged in the social relations of production enables the development of a knowledge around all the basic elements of subsistence. This further contributes to the resilience and wellbeing of the community.

A relevant example here is the Chipko movement in Uttarkhand in the middle Himalayas. In the 1970s and 1980s, the Chipko Indigenous women began a protest to protect their livelihoods that were closely tied to the forests which were being felled for use by urban commercial and industrial interests. The forests provided the rural villages with food, fodder and fuel as well as stabilising the soil and water resources. They were also central to the ecology that entwined with Chipko culture and identity. In their protest, the Chipko women employed the methods of Gandhian non-violent resistance, hugging trees and blocking tree-felling machinery. They succeeded in gaining international recognition, with the UN stating that ‘in effect, the Chipko people are working a socio-economic revolution by winning control of their forest resources from the hands of a distant bureaucracy which is concerned with selling the forest for making urban-oriented products’ (Routledge 1993). There is a parallel here for the future in the West in that the currently wealthy classes of Western Europe, the Americas, the Middle East, Australia and Japan will not be able to live their high consumption lifestyles by drawing on the biomass of Third World countries.

12.5 Principles underpinning future societies

In the wake of the discussions in the theoretical chapters in Part II and the acknowledgement above of the constraints facing future societies, this section sets out the key epistemological issues, the values and principles, and the material framework on which to base societies if we are to maintain a healthy and balanced biosphere. In the terms of Vanberg (1994) (see the introduction to Part IV), this represents a possible ‘constitution’ for these societies. This section draws in particular on some of the ideas emerging from Chapter 11. More generally it builds on the implications for the political economy of global warming as expressed in parts II and III of the thesis but, as explained in the

introduction to this part of the thesis, is not and cannot be constrained by these. in the introduction to this part of the thesis, is not and cannot be constrained by these. The key considerations here are overcoming the metabolic rift by the establishment of metabolically restorative social relations of production.

The fundamental issues that emerged in the study of South Africa revolved around the contradictions between African ecological sustainability and the pursuit of neoliberal capitalist industrialisation within South Africa and throughout Africa. It was pointed out in that study that the expanding capitalist social relations of production and the wealth and growth created from this are continuing to benefit only the minority, while further locking in global warming.

To tackle the multiple ecological crises, we will have to create societies which are conducive to living simply and in harmony with the broad ecology. This will include seeing humans as part of that broad ecology. From Marx we have learnt the principles of the historical material basis of society and the importance of both social and productive relations and of ideology; from Gandhi, we learn the centrality of community and of the universal principles of peace, pacifism and equity in guiding the foundations of a ‘good’ society; and from social movements such as *Campesino a Campesino*, we can learn about the community solidarity required to meet the challenges ahead collectively.

This thesis does not attempt to define in any detail what is meant by a ‘good’ society. Over the centuries, the question of what constitutes a society that is good is one that has intrigued both philosophers and political scientists. The Greek philosophers for example were much concerned with this issue. In more recent times and more immediately relevant to this thesis, Laski (1933: 164) wrote of the impossibility of achieving a good society under capitalism. He argued that a good society could ‘no more make peace between the motives of private profit and public service than it could continue to be half-slave and half-free’. Galbraith (1996: 2) argued that ‘[t]o identify and urge the good and achievable society may well be a minority effort but better that effort than none at all. In any case, there is no chance for the better society unless the good and

achievable society is clearly defined'. However he was not optimistic describing 'the modern political dialectic' in these terms: 'It is an unequal contest: the rich and the comfortable have influence and money. And they vote. The concerned and the poor have numbers, but many of the poor, alas, do not vote. There is democracy, but in no slight measure is it the democracy of the fortunate' (Galbraith 1996: 8).

In setting out these principles, I take heart from Galbraith's comment that identifying 'the good society' may well be a minority effort but better that effort than none at all (Galbraith 1996: 2). There is an imperative for radical change summed up by Lovelock (2006: 7) arguing that the planet is 'a finite and living organism which is suffering a grave illness as the result of human activity, and there exists a threshold, set by the level of carbon dioxide equivalent in the atmosphere', which 'once passed nothing the nations of the world do will alter the outcome and the Earth will move irreversibly to a new hot state'. There is an imperative for action. Before that there is an imperative for establishing the principles and structures which can form the basis of future sustainable societies. These are now spelt out.

The Principles:

1. Metabolic Restoration

Examining the political economy of South Africa in Part II, it was demonstrated that that country exhibits the consequences of a state dominated by the interests of conglomerate capital, with all the resulting aspects of the deepening rift between humans and the environment. Further as identified in Part II, the Marxist concepts of the metabolic rift and metabolic restoration are my starting points for establishing the principles for future social organisation. Addressing the problems created by the metabolic rift requires radical structural change including the dismantling of capitalist social relations of production which currently dominate humans' relationships to the environment in producing their livelihoods. The metabolic restoration means we have to localise production and consumption and limit consumption to what the local

biosphere can support, with a continual cycle of replenishment of the biological basis of production. The capitalist social relations of production need to be transformed into social relations of production that are collective, co-operative and non-exploitative of either humans or nature. Of particular importance is the *dis-alienation* of humans in the relations of production (Burkett 2006: 88). Thus, just as Keynesian reforms cannot address the very basic faults at the root of the capitalist economy, environmentalism that is not grounded in an understanding of the social relations of production and class analysis cannot solve the contradictions in capitalism that have given rise to global warming and the various other crises of capitalism.

The need is for human societies to live within metabolic cycles – that is, production, consumption and waste – thereby forming part of a self-sustaining cycle in which the only new inputs are energy from the sun. There can be no separation between city and country – both supporting ecologically sustainable agricultures to feed the local population. If production is localised and set within the confines of local and regional ecological imperatives, the imperatives relating to the ability of the elements of the biosphere to reproduce themselves and to absorb the wastes from production as part of a sustainable cycle of life are likely to be addressed. Thus this principle of metabolic restoration is founded on a need for humans, in producing their livelihoods, to re-establish their relationships to the land/biosphere, their need to care for, to rebuild and restore the health of the land to allow it to sustain them and to help to restore the health of the biosphere. There is a major change in perception here. The land is the font of life, integral to human survival and wellbeing. The status of food production will be elevated in accordance with its fundamental importance and sovereignty to the community. (I return to food production below under the third principle).

What this amounts to is that any new economy will treat a community's, region's or country's regenerative bio-capacity as a priority and as its wealth base. Biocapacity here refers to the total amount of living matter within a given environmental area, irrespective of any definable use purpose by humans. By establishing biocapacity as the basis of wealth, there is thereby established the

foundation for human relationships with the environment and in turn how humans will produce their means of living. Wealth itself becomes a concept that is intrinsic and integral to human wellbeing and, while it has a material existence, it is not the alienated material riches that come with capitalist accumulation. Thus, the new economics will be a part of a holistic approach to the biosphere and social relations, underpinned by the values of conservation, futurity, equitable distribution and common property. Thus nature, in the new economics, will be recognised as the ultimate source of wealth.

2. Restoration of the Commons

As observed earlier, Lohmann (1999: 13) writes:

[j]ust as in pre-20th century England legal means had to be found or invented to allow landowners full private property rights over land and forests which would allow them to exclude commoners from sharing their pasturage, fuel, and food sources, so exclusionary legal mechanisms are now being formulated to give investors private property rights to parcels of the atmosphere or of forest or plantation carbon.'

Lohmann's description of the commodification of land (but it is also true of the atmosphere) breaks humans' most fundamental relationship – between themselves and the environment - from which they produce the means of their subsistence and survival. It was also noted in chapter 5 that the gradual removal of the dispossessed black population from white farming resonates with Marx's descriptions of the enclosures of the commons and the consolidation of landholdings in England in the 16th and 17th centuries. Hence the second principle lies in re-establishing the importance of the commons – the air, water, sea, rivers, forests and land – which remain outside the realm of private property. Here the issue is both global and local. For example at the global level, Harcourt (2011: np) writes of the need to think 'beyond aid and charity solutions, beyond disaster scenarios and climate denial and beyond the current North-South impasse to talk about the commons we are sharing. Citizens living in elite urban enclaves in the North and South need to change

ways of life and values in order to stop the selling of land, forests, water and land, the destruction of communities, traditions and knowledge.’

The value placed on the commons in the future would be greatly enhanced with the result that they will then be cared for by local communities in custodianship for future generations. For example, the rivers, lakes and ocean shores will be returned to the commons to be farmed and managed by local communities, using appropriate, low scale technologies and community based institutions. As Shiva (2002: 20)) writes in the specific context of water as a part of the commons:

Throughout history and across the world, water rights have been shaped both by the limits of ecosystems and by the needs of people. Water has traditionally been treated as a natural right – a right arising out of human nature, historic conditions, basic needs, or notions of justice. Water rights as natural rights do not originate with the state; they evolve out of a given ecological context of human existence.

As Shiva (2002: 21) claims, for thousands of years ‘[r]iparian rights, based on concepts of usufructuary rights [i.e. legal rights to use], common property, and reasonable use, have guided human settlement all over the world’. Such rights involve notions of responsibility for and sharing and conserving of the commons so that it is not diminished.

Where Indigenous communities remain intact and are able to look after forests, these forests will be returned to their custodianship. Land will become common land just as the ecology will become common ecology to be taken care of by the community. Such a process both changes the social relations of production and brings people into direct contact with the land and with nature, thus also contributing to overcoming the alienation in the metabolic relationship between humans and nature under the capitalist system. Humans have to respect and understand the soil and its role in the metabolic connection between humans and the environment. This relationship is very grounding yet to my knowledge has been little theorised about, although Karl Polanyi, in *The*

Great Transformation (1944) and quoted in Bellamy Foster (2002: 31)

captured the centrality of land when he wrote:

What we call land is an element of nature inexplicably interwoven with man's institutions. To isolate it and form a market out of it was perhaps the weirdest of all undertakings of our ancestors ... the economic function is but one of many vital functions of land. It invests man's life with stability; it is the site of his habitation; it is a condition of his physical safety; it is the landscape and the seasons. We might as well imagine his being born without hands and feet as carrying on his life without land. And yet to separate land from man and organize society in such a way as to satisfy the requirements of a real estate market was a vital part of the utopian concept of a market economy.

One can draw parallels between the commodification and marketisation of land of yester-year with contemporary policies which, through carbon taxes and emission trading schemes, are bringing the atmosphere into the privatised, marketised and commodified domain. For future societies the move back to a recognition of the importance of the commons provides the basis for building healthy co-operative relationships with others who are also engaged in this most essential of human activities, i.e. producing for their own subsistence. Social relationships are then built on a healthy basis and with a common aim, with no artifices, no class divisions and no opportunities for exploitation.

There is little point to private property if there is no capital accumulation. In *The Right to the Use of the Earth*, Herbert Spencer (1851: IX: 1) wrote '[e]quity does not permit property in land, or the rest would live on the earth by sufferance only. It is impossible to discover any mode in which land can become private property. A claim to the exclusive possession of the soil involves land-owning despotism'. Spencer concluded that property belongs to the 'great corporate body', that is, the whole of society, the commons. New institutions need to be created which develop and support the values of communitarian life and communal ownership, for the cultivation of citizenship, the sense of community, of sharing and belonging. Prior to 'development', communities preserved their social cement and survival by curtailing personal

desires and acquisitiveness, subordinating these to the interests of the common good. The values of mutuality, interdependence and reciprocity need to be fostered and become again a part of future societies.

3. Ensuring Food Security

Food security is a predominant concern of all human societies and for this reason food sovereignty - the ownership and control over the seeds, the planting, caring and maintenance of food growing and preparation - needs to be returned to the community. It is also inherently entwined with the maintenance of the commons and with stopping the forces driving de-peasantisation. This issue will come increasingly to the fore in a global warming world. Food security was defined by the of the World Food Summit (FAO 1996: np) as ‘when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life’.

The study of the marketisation of the economy within South Africa identified land grabs and the industrialisation of farming as being critical, transforming increasing numbers of rural small holders into the proletarianised unemployed without a future,, as argued in this thesis in relation to the massive process of de-peasantisation.

It is also the case as identified earlier that the metabolic rift is today nowhere more evident than in the closely linked areas of global warming and food security. This is highlighted through the growing control of food by mega corporations, the super exploitation of labour involved in food production and the depeasantisation and land grabs taking place for food and biofuel production and the huge levels of food, and, as Marx saw from Liebig’s work, the destruction of soil fertility.

Food security will depend on a whole range of fundamental changes in the social relations involved in food production and consumption. Global movements such Via Campesina, for example, have been implementing food

sovereignty practices, where the real producers of food have control over the food economy; that is they have sovereignty over their food production, thus enabling food security.

Food security is one important site at which capitalist and post capitalist societies diverge in relation to fossil fuels. It is also a site at which another of the contradictions of capitalism is exposed, as decreasing percentages of national incomes are attributed to the agricultural sector. Non-industrial agricultural practices have traditionally been and can again be developed to be independent of fossil fuels, through adopting metabolic cycles around humans' production of food and their relationship to the land; through growing and consuming locally and eating seasonally; and by eliminating the industrial scale production of animals and animal products and grain growing. Furthermore, there is evidence to suggest non-industrial farming practices, such as permaculture practices, absorb rather than emit carbon (Pretty 2009, Pimentel *et al.* 2009) and sustainable farming practices generally provide 'a range of valued public goods such as clean water, wildlife, and habitats for beneficial organisms, carbon sequestration in the soil, flood protection [and] groundwater recharge' (Pretty 2009: 48).

The alternatives to industrialised agriculture are captured under the loose heading of 'sustainable agriculture' which has numerous expressions - biodynamic, permaculture, organic, free range, localised, community based – all of which have a broadly common philosophy, that of producing food in a manner that is more harmonious with nature. Importantly, and not so often emphasised, such food production processes have at their heart particular social relations of production which are non-classist and non-hierarchical and in which the actors are directly involved in producing their means of survival. They are also directly engaged in a symbiotic relationship with the land, the soil, the local ecology, the produce they consume and the community of producers. The energy used in such productive processes can be, and often is human or animal energy, the production of and waste from which are parts of the complete metabolic cycle.

For future economies, local community organic agriculture represents an important paradigm in food production. This is currently practised in 120 countries, representing 31 million hectares (ha) of certified croplands and pastures plus more difficult-to-quantify, uncertified organic production systems of several million small farmers (Scialabba 2007), including Indigenous food producers who follow organic principles, even if inadvertently. Urban agriculture will be a centrepiece of the transformation to sustainable living.

Bio-diverse, localised, ecological agriculture will reduce greenhouse gas emissions significantly. Furthermore, such practices will improve biodiversity and soil quality while reducing the need for water. They are conducive to a wide diversity of plants in a small area, providing its farmers/communities with a healthy and mixed diet and greater resilience, as, if disease or pests attack one plant species, there is more chance that all is not lost. Borrowing from the principles of heirloom production, seeds are collected from the best produce, further building local resilience and breeding crops suitable to the local environment.⁷⁹ Organic agriculture is premised on humans as custodians of the ecology and of the importance of looking after the soil and keeping a high humus and healthy soil organism content. Evidence shows healthy soil absorbs carbon from the atmosphere (Wightman 2010) and humus rich soil reduces water consumption. Most importantly, for global warming, local and biologically diverse agriculture can reduce greenhouse gas emissions while at the same time improving the security of farmers' livelihoods and improving the quality and nutrition of food.

Such organic agriculture (Pimental *et al.* 2005, Scialabba 2007) will contribute to reduced consumption of fossil fuel energy carbon dioxide emissions (48 – 60 per cent less, except for very intensive crops, according to Scialabba 2007), reduced nitrous dioxide, reduced soil erosion and increased carbon stocks, as well as much higher carbon absorption in comparison with conventional agriculture. Organic and labour intensive agriculture produces a net carbon

⁷⁹ This gathering of seed and growing locally produced seed is one of the key principles in heirloom vegetable production. The other is maintaining plant diversity.

sink which, as Hallowes (2009) suggests, can transform agriculture and secure a fair exchange between the producers and consumers of food in what is a critical part of re-orienting the economy to make it more resilient in the face of global warming.

4. Community of Producers

The study of South Africa and its capitalist development model with its inexorable dependence on fossil fuels and relentless pursuit of growth reveals (as indicated in part II) the consequences of a state dominated by the interests of conglomerate capital, with all the resulting aspects of the deepening rift between humans and the environment. It exposes the commonalities of interests of global elites, the merging of corporate and state interests and the significance of power and hegemony in preventing the development of metabolically restorative and harmonious communities. It demonstrates the distinctive, hegemonic and dangerous power of corporations to society.

This points the way for a new economic system to be built around new social relations of production so that the most fundamental relationship - of human labour to the environment - will be transformed. The value of labour will be intrinsic in the sense that the new economic system will be built around new relations of production so that the most fundamental relationship - of human labour to the environment - will be transformed. The value of labour will be intrinsic in the sense that each human will be directly engaged in his or her own means of survival in relation to the land and the producing of goods for exchange. Excess value, or surplus value as it became in capitalist societies, when created, will become a part of the commons. No one person or community will be able to use or accumulate more than their share of the biomass. There is thus an overturning of the fundamental principles of neoclassical economics - private property and accumulation.⁸⁰

⁸⁰John Locke's treatises on property effectively legitimized the theft of the commons in Europe during the enclosure movements of the 17th century. These treatises continue to inform theories and practices that erode the commons and destroy the earth. (See Shiva 2002: 25.)

The emphasis is on placing the environment at the centre of the value system. As Foster and Clark (2009) maintain, there needs to be a broader social and ecological conception of wealth and a reconsideration of extrinsic and intrinsic, exchange and use values. Marx argued, in relation to use values, that nature should not be reduced to a mere commodity. Quoting Thomas Muntzer, a revolutionary leader of the sixteenth century German Peasants War, Marx observed that it is intolerable that ‘all creatures have been made into property, the fish in the water, the birds in the air, the plants on the earth - all living things must also become free’ (Foster and Clark, 2009: np).

Marx (quoted in Muntzer 1988: 335) wanted a society of associated producers who would ‘govern the human metabolism with nature in a rational way, bringing it under their collective control instead of being dominated by it as a blind power; accomplishing it with the least expenditure of energy and in conditions most worthy and appropriate for their human nature’. At the time of writing, he could not have envisaged that the society of associated producers, the socialist society he advocated, would spawn varieties of state socialism in a large number of states that were antithetical to Marx’s philosophy, and at huge cost to many millions of people, and the environment. The state socialism – of the former Soviet Union, China, Cambodia, Vietnam and Eastern Europe – is clearly not the alternative model being proposed in this thesis for the future. It is noteworthy that the terms ‘socialism’ and ‘communism’ have become problematical because of their historical baggage. The damage these state socialist regimes have done to Marxism is very great indeed and the triumphalism of the capitalist west in the wake of the fall of the Berlin Wall was no time for a reasoned assessment of state socialism versus Marxist ideals.

A possible parallel here could be the various interpretations which have been placed on the Christian Bible and which have never been used to justify the Inquisition, the Crusades or, more recently, the activities of right wing Phalangists⁸¹ in Lebanon, all brutal and extremist, built on what appear to be readings from the Bible which others interpret as a philosophy of peace,

⁸¹ Christian fundamentalists

pacifism, love and understanding. Yet interestingly there has not been the same ridiculing nor condemnation of the Christian church in the wake of its many sins, as there has been of Marxism in the wake of its undeniably horrific transgressions during the 20th century.

Transforming to a society of associated producers from a capitalist society, in which humans have been inculcated with the behaviours and values of competitiveness, material acquisitiveness, individualism and selfishness will be a high-risk venture. As argued in this thesis, however, transform we must. Building social solidarity amongst people and developing utopian visions and idealised values as possibilities for the future are central. We need philosophers, dreamers and utopians as never before to sketch and legitimise visions of just and good societies.

5. Contracted No-growth Economies

As identified in part III, the significance of class to global warming is profound. In the specific context of South Africa and in turn Africa, as Satgar (2009: 52) writes and as already noted in Chapter 8, there has been a ‘further deepening [of] Africa’s integration into the global political economy’ which is being mediated by class interests, in particular the role of a transnational faction of the African ruling class. This is expressed through the maintenance of a neoliberal economy, the growing gap in wealth and security between those who benefit and those who carry the burdens of capitalist development.

Foster et al. (2010) argue that under capitalism the overexploitation of nature’s resource taps and waste sinks has reached the point where both are negatively impacted, affecting the climate and the biosphere itself. They thus point to the need for economic regime change, with an end to economic growth.

Thus building on the evidence in this thesis that human production and consumption have gone beyond what the planet can support (Simms and Johnson 2010),⁸² future societies will have to be built on contracted, no-growth economies. That means an

⁸² If the whole world wished to consume at the same rate as the industrialised nations, it would require 3.4 planets like Earth.

end to capital accumulation, economic growth and private property; in essence, an end to capitalism. The current rate of growth of global production and consumption has not only to fall; global production must contract – and sufficiently to allow for any population growth in the future – and be equitably redistributed within the constraints laid out above. The simplicity principle, that is the way of life to live with less, will have to prevail. Under capitalism, no growth means social collapse, mass unemployment, poverty, homelessness, civil unrest, foreclosures of housing, schools and other public services, and instability. Transformation from the capitalist system is thus fraught with dangers if that transformation is not planned and organised. However, under the new community-based metabolically restorative economies, advocates such as Hopkins (2009) and Holmgren (2009) see the new community-based structures as promising positive alternatives to what we have in society today. Hopkins (2009: 21) writes that this transformed future ‘offers the potential for a society which is better in many ways, more connected to nature, healthier, with more meaningful work, access to nutritious food, enhanced social capital and more cooperation’.

6. Equity, Ecological Debt and Redistribution

It was concluded in Chapter 8 that ‘South Africa needs to democratise its institutions, de-globalise, de-commodify, nationalise and redistribute its wealth, overthrow its social relations of production and become a good neighbour on the African continent, supporting sustainable, equitable and inclusive human development for all’. Most fundamental here in terms of tangible outcomes is the question of redistribution.

The sixth principle is thus one based essentially on the notion that each person is entitled to an equitable share of the Earth’s biomass, including adjustment for the historical distortion of wealth distribution. Whereas within the capitalist system, Marx saw redistribution as merely a palliative mechanism, redistribution in the new paradigm will be an adjustment for inequities caused by colonialism. In the new economies the nature and function of distribution will be clearly different from distribution in neoclassical economics which is based on the notion of profit maximisation. There is no profit to maximise but

a surplus to be distributed and this is to be done by the community to the community. There is no individual utility to be maximised but instead community wellbeing to be achieved through, amongst other things, principles of equity and fairness of distribution. This means that contrary to what happens in neoclassical economics, where the supply side and the demand side are in theory at least, completely separate, here the community is both producer and consumer, both collectively and in the full recognition of the finite nature of the biosphere.

Crucially here and at the heart of the new societies is the question of what is meant by just or fair. To examine this however there is a need first to acknowledge that a central tenet of capitalism is a supposed freedom of choice and the idea that the individual is able to use his or her autonomy to decide what he or she wants and does so in such a way as to maximise their utility. This is neoclassical economics' so-called consumer's sovereignty. This is the freedom that is at the centre of neoclassical economics, freedom of enterprise, freedom of choice, free trade and so on. As Stanlake and Grant (1995: 19) state the 'freedom of consumer choice is usually held to be the most important of these economic 'freedoms'. The consumer is regarded as being sovereign since it is the ways in which he chooses to spend his income which determine the ways in which society uses its economic resources'.

In the new societies individual consumer sovereignty will be severely constrained within principles established by the community. As Joan Robinson (1972: 274), one of the most eminent economists of the 20th century, argued '[n]o-one who has lived in the capitalist world is deceived by the pretence that the market system ensures consumer's sovereignty'. Robinson (1972: 274) states: '[t]he true moral to be drawn from capitalist experience is that production will never be responsive to consumer needs as long as the initiative lies with the producer.' Nor can there be consumer's sovereignty when three fifths of the world's population live in poverty, that is, the poor's existential reality is that they cannot consume what they want, for many, even of the most basic of survival necessities. Furthermore, the very concept of 'consumer' is a concept of capitalism which will be replaced in future sustainable societies by

critically conscientised citizens whose concerns will not just be in seeking sustenance and shelter from the environment, but in nurturing and being custodians of the environment.

This does not mean there will be no differences in individual preferences but what is available and in what overall quantities will be determined by the community. Each person will contribute to the community and each will be entitled to consume only their fair and just quantity of goods, including food, clothing and shelter. What is fair and just is determined by one's ecological footprint entitlement and one's biological needs. This is fundamentally different to current capitalist society where those with the highest incomes/wealth accumulation and thus entitled to the greatest ecological footprints are in many cases not those who contribute most to the wider society – the high-fliers in the financial and banking sectors and the owners and CEOs of major environmentally destructive mining conglomerates.

The concept of ecological debt repayment is relevant since the question of from what point societies begin their transition cannot ignore the past. It can be argued that the whole history of capitalism provides an account of the development of the gross inequalities that exist on the planet now.

While the concept of ecological debt has yet to be operationalised, it played a significant role at the United Nations Earth Summit in 1992 (see section 3.3) in that it was proposed that the external debt of the South be swapped for the region's ecological and social losses derived from colonialism and past exploitative foreign investments. It has become a guiding principle amongst climate justice movements, especially those from the South. It can be used both conceptually and eventually to assist quantification in reassessing relations between the classes, the rich and the poor, the colonised and colonisers and in finding solutions to such issues as Third World debt, climate justice and access to the atmospheric commons. It can place the global warming crisis in a historical context once it is accepted that such a context is necessary in finding just solutions to global warming. Most fundamentally it can be used to address the problems faced by the atmospheric commons which will be exhausted as a

carbon sink, perhaps in less than 10 years. There need to be equitable rights to this sink but taking due account of the way in which it has been used to date and crucially by whom i.e. the industrialised countries.

There is thus a strong moral compunction for the repayment of ecological debt by those who have exploited the biosphere in the past. These repayments can then be used to pay for the transition to new sustainable societies. There is no institution however currently in existence to unravel and enforce such debt repayment. Current international institutions seem only to exacerbate the problem. That needs to change.

7. Real Participatory Democracy

In chapters 6 and 7, with respect to the power of the energy sectors and their entwinement with the state, it became clear that these represent a threat to the fragile democracy that is South Africa today. As Fig (2007) argues, that power is significant in driving macroeconomic policy on the continent. It is a major influence on global warming and on the prospects for South Africa getting to grips (or failing to get to grips) with global warming. The ‘democracy’ that emerged after 1994 and is supposedly enshrined in the constitution is exposed as a sham. What it reveals and this is by no means unique to South Africa is the need for a more genuine form of democracy which involves citizen participation and the removal of power structures based on class.

There is thus a need to ensure that economies of the future will be democratic but a thick form of democracy and not as Galbraith (1996: 8) has described current US democracy as ‘the democracy of the fortunate’. As Wright (2010: 367) suggests, the key to ‘realizing radical democratic egalitarian conceptions of social and political justice requires social empowerment over the economy’. Significantly, as is argued in this thesis, such social empowerment (Wright 2010: 368) ‘is not restricted to meaningful democratic control of the state; it also means the subordination of economic power to social power.’

One consequence of these new economies and communities will be that there will no longer be such inequitable purchasing powers as currently and social status will not be derived from one's material accumulations. Such shifts will result in benefits not only for everyone's health and wellbeing (see Wilkinson and Pickett 2009) but will enable societies and communities to reflect more genuinely the will of the people in total. Economies of the future will be driven by ecological and social principles.

Such principles require that there will be considerable decentralisation, scaling down and localisation of economic activities. This will entail a large degree of de-industrialisation and reduced energy consumption as non-essential goods and services are removed from the economy. Addressing this energy descent, de-industrialisation and the contraction in production will require a transition to more labour intensive technologies and productive practices. While labour intensive will be a characteristic of production, people in future societies will also have more free time, as there will be fewer goods to produce and the vast numbers of currently un- and under-employed people will all be involved in the production of food and other essentials. In the new proposed localised community-based economies, technologies will not be capital intensive, will be developed to meet the specific needs of the local community and will remain under the control of the community.

The ideology of progress, so central to capitalism and so intimately associated with technological developments, will be replaced by a more simple way of living, a sense of security and connection, of *dis-alienation* and metabolic restoration. It is reasonable to anticipate that people's sense of interconnectedness and dependence on the broad ecology and local community will have implications for population numbers as people's security and quality of life will depend on maintaining the metabolic balance between humans and nature. People will no longer be commodities to be bought and sold as labour, but will have a direct relationship to their produce, the fruits of their productive processes being theirs to consume or exchange. Community resilience, that is, the community's ability to respond and adapt to situations and self-sufficiency, will be enhanced by the localisation of the economy. The economy will thus be

based on non-exploitative practices, non-exploitation of land, labour or communities; there will be no basis for profit or the commodification of goods or services.

12.6 Future research directions

In considering future research directions, let me return to the main research objective of the thesis which is embodied in the question ‘Can capitalism solve the problem of global warming?’. I have attempted to answer this within the thesis, although clearly more work can and should be done on various facets of this.

Beyond that there are six sub objectives to this thesis. Let me set these out again, identifying where I see future research being needed before going to some broader research considerations that the thesis has thrown up.

1. To place the discussion of global warming into a critical theoretical context, emphasising the importance of the distinction between critical theory and positivism.

The thesis has demonstrated that, in terms of the political economy of global warming, future research needs to be bedded in critical theory, critical education and in international solidarity with climate justice groups. The ‘people’ as citizens are in many respects ahead of their governments (and research institutions) in wanting action on climate change. Research is needed on how to harness that and get governments and global institutions to act.

Most of the research on global warming is within the positivist framework. This means, as the thesis has argued, that there is a major lacuna in understanding and action around global warming. In the main body of the thesis, I have revealed these gaps in research are substantial. It follows that there is a major body of research using critical theory waiting to be done. It is perhaps significant that, based on my experience with the ‘microcosm’ of South Africa, the extent to which these issues are being researched in that

country is markedly greater, than for example, in Australia. There is a research project waiting to be done to analyse why there is such a relative poverty of research using critical theory and methodologies in countries like Australia.

2. To summarise what the science is saying about global warming and the health of the biosphere.

This is already well researched.

3. To document and outline some of the key criticisms of neoliberal solutions to global warming.

The thesis has sought to do this within the confines of a PhD. More research is needed on this front. Perhaps where it is most needed is in how best to get across to governments and people that the oft proposed neoliberal solutions to global warming will not work and why this is the case.

4. To present a microcosm of the globalised capitalist system from the perspective of political economy. The microcosm selected is South Africa.

There is already considerable rich research on this. This is not a priority area for future research.

5. To provide a Marxist theoretical framework for criticism of aspects of capitalism selected for their relevance to global warming.

I have found that the revival of research on Marx and Marxism in recent years is most welcome on a number of fronts. Yet having said that, I have established what literature does exist in this area with respect to global warming, while most helpful and of very high quality, is limited to perhaps ten names and to the more radical journals. That needs to change. Thus research within the Marxist theoretical framework specifically on global warming does need extension. This to me is a key area for future research. The thesis has also

sought to demonstrate that research needs to focus on how to save the planet. The message of the thesis is that that cannot be done under capitalism and yet the existing climate of denialism prevents that being acknowledged in a number of research institutions.

6. To develop alternative core social, political and economic principles compatible with a diversity of just and sustainable futures.

In looking to the future, to societies which might be based on these principles, it is necessary to research into what is needed to help to get us there. With respect to research on the political economy of global warming, what the thesis has shown is that any such research needs to accept that there is very little time left before irreversible tipping points are passed and humanity is on a global warming trajectory over which we no longer have any control.

More generally and stepping back from these immediate more empirical and policy concerns, there needs to be research on how to address the ideological hegemony which supports the distortion of priorities of saving capitalism at the expense of the planet. The principles set out in this thesis need to be developed further with more empirical flesh put on these, still rather delicate bones.

The most important research question however lies in how to bring about transformative change. The existing literature is scant on this. Answering this question of transformative change - which I see as a political economy question but has so many dimensions including ideological, economic, political, cultural and anthropological as well – is where the major research focus needs to be. How to bring about transformative change in the time frame available is the big question.

The possible sites for further research are manifold, if we are to transform society to one that is metabolically restorative and in equilibrium with nature. Much of the knowledge needed for living in harmony with nature is already known and available. The critical blocking point is the hegemonic nature of

capitalist ideology and the vested powerful interests which converge to protect the *status quo*.

Other areas for further research include the myriad of crises arising from the capitalist system and how these will increasingly compound and intersect with each other; how the financialisation of the economy is linked to growing poverty, insecurity and inequality; how the capitalist model of development is disenfranchising and proletarianising small scale farmers in Africa, Asia and Latin America; and how food security and food sovereignty are being threatened by conglomerate ownership, regulation and control. There is a case for more research on operationalising the concept of the ecological footprint and ecological debt; and on how to get the governments, communities and people of the North to accept a fair share of responsibility for refugees and displaced people. There needs to be more critical evaluation of arguments that technology alone can provide a solution to global warming.

12.7 Conclusion

The new societies and economies will be built on the principles of the centrality of the local community, restoration of the commons (land, water, air – the biosphere), metabolic restoration, equity and justice. Humans and hence labour are a part of nature, but when the social relations of production are alienated and exploitative, the ruling class exploits not just the workers who work nature; they exploit nature as well, extracting profit from nature. In the new post-capitalist economies, there can be no capitalists, no dominant class. Conversely, there can be no alienated labour, there will be no labour which is working without care for nature's nurturance and health. Then labour, which is producing food from the soil, will form a restorative, metabolic relationship with the soil; will come to know the soil; will understand how it works; what it needs to be healthy, full of the life-giving microbes and part of a healthy carbon cycle; how the metabolic cycle of growing, composting, replenishing the soil for what it has produced; and that, in this process of producing humans' livelihood and food security, will acknowledge that this underpins the relationship between humans and nature. As such this human/nature

relationship will overcome the alienation found in the various levels of social relations between humans and between humans and nature in existing capitalist societies.

In the new community-based systems, where property is community controlled, there will be no capacity (or motivation) for accumulation. This is compatible with the metabolic relationship between humans and the biosphere. Humanity's common resources will be for the benefit of all. The potential to accumulate more than one's biomass entitlement is removed and any surplus is for the benefit of the community. The detail and practice of how this will work remain to be addressed. The thesis stops at setting out the requirements but each human being will have a need to have their caloric, shelter, water, social and cultural needs met within the confines of biosphere capacity.

Harvey (2001: 61) writes that the definition of scarcity is 'inextricably social and cultural in origin. Scarcity presupposes certain social ends, and it is these that define scarcity just as much as the lack of natural means to accomplish these ends'. He continues that '[s]carcity is in fact necessary to the survival of the capitalist mode of production' (2001: 61). In the new society the ideology around resources is different. It is based on the concept of sufficiency and maintaining the biosphere's health through the ethos of custodianship.

It is thus proposed that these principles – this constitution to use Vanberg's (1994) term - form the basis for the organisation of future societies so that such societies are sustainable, just and equitable. They also represent propositions to consider in showing that other ways of living are not only possible but may bring greater meaning and purpose to society and help lay the foundation for a future for humankind, very possibly even a better future. I have not included negative principles, such as there will be no armaments, no warfare, no space travel and so on, as the economic fundamentals of future societies will not support, nor have the motivation, for such, what will be then, anti-social activities. The world is in desperate need of utopian and radical visions without which there is little chance of redirecting the current course of human history. In proposing these principles, I have attempted to bring together the constraints

facing the planet as spelt out in section 12.3 and a set of principles (in section 12.4) to underpin the social organisation of human societies around that most important relationship of all, how humans organise their social relations in meeting their physical needs from the environment, that is, the way societies support and perpetuate themselves. Bringing all of this together is the crux of any successful endeavour to address the practical and theoretical problems of global warming (as discussed in parts II and III) where humans both act upon and are part of the environment in securing their livelihoods and that of future generations.

This part of the thesis has also identified a number of key principles in designing a blueprint for future societies, beginning with an acknowledgement of the enormous diversity of peoples, geographies, cultures, social and economic systems - a diversity which is currently 'being swept away, crushed under the homogenizing heel of the circulation and accumulation of capital' (Harvey 2001: 119). For that diversity to be maintained and fostered is essential to the quality of life of future societies. The hope has to be that the human species has a sufficiently deep sense of connection and commitment to enable it to build on a commonality in finding solutions to our universal desire for survival.

Finally in this chapter I have sought to indicate what research on the political economy of global warming needs to be done to guide humanity for the future. In doing so I have emphasised that, according to the findings of this thesis, there is no longer a need to research into the problems created by capitalism. The urgent research tasks are how to move to that post capitalist world and what that might look. The thesis represents a start to both.

CHAPTER 13 Summary and conclusion: can global warming be solved by capitalism?

13.1 Introduction

This thesis has sought to address the question of whether capitalism can solve the problem of global warming. This is a question of particular relevance in the West where, despite what the science is telling us about global warming, the dominant institutions of capitalism remain largely unchallenged in any transformative sense. This whole thesis has enunciated very clearly that capitalism cannot solve the problems of global warming. Capitalism has created the problem of global warming. While in so many quarters and so many countries and so many global international institutions there has been a continuing hope that capitalism might provide the answer, this thesis responds to this question with a resounding no. Such a response may well be provocative to many in the West who are used to seeing the world through the epistemological framework of capitalism.

The methodology adopted as set out in section 1.3 is that of political economy, using critical theory and drawing quite heavily on Marxist theory. It was highlighted that one of the major problems in finding an effective solution to global warming is that the hegemonic nature of capitalism over the last 400 years has blinded us from being able to evaluate critically the political and economic framework in which we in the West are embedded. To address this problem, this part of the thesis first turned to why critical theory is important in seeking to understand phenomena such as global warming. It was emphasised that these phenomena arise from particular social relations of production and a particular political economy and ideology (that is, capitalism) which have become increasingly hegemonic over the last century.

Also in that first part of the thesis, it was indicated that not only is the evidence of global warming irrefutable and the consequences both imminent and on a global scale but, due to the non-linear nature of the phenomenon and the

amplifying effect of tipping points, we are at a critical point in the global warming process where we have to decide whether to continue with the capitalist system or undergo radical, revolutionary systemic change to just and sustainable political economy systems. The most optimistic assessment of the science is that, at the very least, the planet is on red alert. We have now reached the stage in the history of the planet's ecology whereby capitalism's appetite for resources and its production of waste threaten the survival of humanity and other species. This ecological crisis, if not addressed immediately, will be terminal; it could result in the extermination of most species on the planet, including humans.

What the science is telling us about global warming is both simple in its overriding message and complex in its detail. There are powerful vested interests able to take advantage of the latter, obfuscating both the messages from the science and the urgency of these messages, and promoting denialism, skepticism and delays in action.

Predominantly, there is acknowledgement that anthropogenically-caused global warming is taking place and neoliberal institutions have come up with market, biological and technical solutions to address global warming. The solutions, however, are all based on the non-negotiable premise of maintaining the political economy *status quo* of global and national economies, of continually growing economies and the impossible promise of progress and prosperity for all. Yet this same economic system has impacted adversely on the ecology of the planet since the beginning of the industrial revolution. Within the capitalist system, those who hold power take a deductive, compartmentalised view of global warming, treating it as solvable through the mechanisms of capitalism: the market, market-driven technologies and biofuels. The first part of the thesis provided a criticism of these solutions, arguing they were dangerous distractions in that not only would they not solve the problem; they have the potential to exacerbate it and to delay the effective actions urgently required. It was concluded that neoliberal views of global warming framed the problem incorrectly, de-contextualising it from the very history and political economy which have given rise to it. These 'solutions' would add to economic growth,

with such growth being particularly strong in those parts of the economy which both service the rich and are most carbon emission polluting. Thus I have argued for example that taxing fossil fuels is not a deterrent (to consumption) for the richest stratum of global society. That stratum is in essence so rich and has such a massive disproportionate share of total income - and in turn consumption - that even substantial price increases would do little to shift its consumption patterns away from its current fossil fuel dependence (Kapur *et al.* 2006).

An early and crucial point in the research on this thesis situated global warming within a wider context, comprising the many problems arising from global capitalism. The thesis argued that, when the issue of global warming is combined more generally with the evidence of the destructiveness of capitalism on the environment and society, single-issue, deductive solutions can better be understood with respect to their ineffectiveness and inappropriateness. This myriad of problems includes: declining biodiversity and the disappearance of species; the increasing fragility of ecological sub-systems; the crises facing the majority of the world's rivers and lakes, desertification, deforestation, salination, soil erosion, and the pollution of land, sea and air and the acidification of the oceans; the continuing disappearance of whole languages and cultures; food and water crises (which are both socially constructed and a result of changing biospheric conditions); the ecological overshoot which is occurring earlier and earlier each year, as we consume the planet's biospheric resources faster than they are being regenerated; peak oil; and more. These crises are compounded by a profound and growing global inequality and cultural homogenisation. Most recently, the global financial crisis – the crisis of capitalism itself - has been attended by a further transfer of wealth from the public arena to the private, and hence to the rich. All of these crises arise out of the same global social relations of production. The thesis thus argues, indeed takes it *modus operandi*, from the fact that global warming is but one of the many manifestations of the problems of the capitalist system – and global warming cannot be solved without systemically tackling the enmeshed myriad of other problems.

However, because of the hegemony of capitalism and the proposed solutions to global warming, I have examined these but with most emphasis on criticising market approaches since these are most favoured in current policy debates. I have provided evidence and argument refuting the efficacy of such solutions. This, along with the urgency and incontrovertibility of global warming evidence, underpinned the whole approach of the thesis.

The first part of the thesis also concluded that, while renewable technologies such as wind and solar have an important role to play, they could at best meet only a small part of the energy needs of a capitalist growth economy. This is particularly the case given that there is a fossil fuel energy cost, and other environmental costs, in providing these technologies, such as in mining and in the use of highly polluting rare earths required for their construction. Furthermore, renewable energies do not do anything to help to transform the social relations needed to tackle global warming even though they have the potential for adoption within more equitable and democratic social structures. Given the atmosphere is already ‘overloaded’ from carbon dioxide emissions, and there is no room left for ‘undeveloped’ countries to lift their impoverished populations to an even basic standard of living, it was argued that resources to develop renewable energies should be diverted to poor nations.

The thesis further argued that the Copenhagen Accord, drafted by the US, China, India, Brazil and South Africa at the conclusion of the 15th Conference of Parties of the UNFCCC held in Copenhagen in December 2010, encapsulates the failure of international leaders to address global warming in any meaningful way, even within the doomed-to-fail terms of capitalist political economy.

13.2 South Africa as a microcosm of the global economy

The empirical side of the thesis focussed on South Africa, chosen for study because it represents a microcosm of many aspects of the global economy. Additionally it reveals the contradictions of a country being on the front line in both facing the consequences of global warming and perpetuating its causes. South Africa’s history reveals the deepening of the rift between humans

(expressed in terms of class) and between humans and the environment, as it traces human development from colonial times through to racialised capitalism, followed by neoliberal capitalism, a system which has brought deepening inequality in a country that now ranks amongst the most unequal on the planet. The South African study looked at the historical development of the economy and within that of the South African coal and energy sectors. These are inextricably linked with the processes of accumulation and impoverishment, expansion and dispossession within South Africa and the wider African continent. South Africa exemplifies the socially divisive and ecologically destructive forces of capitalism. The study of South Africa however also performed the role of allowing me to learn from that global microcosm what selective parts of Marxist ecological theory were particularly relevant to this thesis.

The South African political elite continues to build on the legacy of poverty, inequality and injustice and is an integral part of globalised capitalism, actively engaged in taking this model of political economy to the rest of Africa. In this capacity, South Africa is a hegemonic nation on the African continent and well positioned to influence the destiny of other African nations. The study showed how South Africa represents a semi-peripheral nation within the global political economy. It has adopted the practices of neoliberal capitalism and expanded capitalist social relations into other parts of the African continent. The South African study presented a slice of this hegemonic political economy through the coal and electricity sectors, providing a view of what constitutes electric capitalism at work. It promotes at home, and in other African countries, an ethos of capitalist management together with unsustainable development structures, disempowering, dispossessing, de-peasantising and proletarianising the population. It was concluded that South Africa illustrates Marx's ecological critique of capitalism as a system of 'unsustainable development rooted in the continuing pillage and unceasing exploitation of humans and nature' (Marx, *Capital*, vol 1, 1976).

The study of South Africa began by looking at the African context of South Africa, highlighting the adverse consequences of global warming on this

continent which is still reeling from the impacts of colonialism and continuing ecological imperialism. The majority of the one billion Africans have a very small ecological footprint, contributing nothing of substance to the global ecological crisis. The majority population has already only a fragile foothold on survival. It was identified that global warming will impact - is impacting already - most heavily on the African continent and this for various reasons: its lack of infrastructural supports for the population; poor governance structures; the lack of voice in the international arena; and the continuing legacy and practice of ecological exploitation by nations and elites at the centre of the global economic system.

It was concluded that anything over a 1.5⁰ C temperature increase in Africa will be catastrophic for many Africans as a result of more droughts and more severe droughts, expanding deserts, exacerbated water stresses, extreme weather events and food insecurity. The majority of Africans are directly dependent on the weather for the production of food through the growing of crops, foraging in commons areas, seasonal grasses and fruits. The African continent has many delicate and niche ecological systems which are vulnerable to climate change. It is clear that the disturbance of these niches, through rapid climate change, will have far-ranging negative consequences for the larger ecology, including humans.

The South African study also outlined the projected population growth of Africa and the large and growing numbers of populations living in urban slums with no infrastructural support or adaptive capacity. It was predicted that global warming has the potential to push many over the brink, causing devastating catastrophe for enormous numbers of Africans even early in this first half of the 21st century. The study illustrated the power links between South Africa and global institutions through a recent World Bank loan to the coal-electricity sector. It was concluded that this loan was another example of the global elite acting in concert with a national elite against the interests of the environment, of the majority South African population and, in a very real sense, given that the loan allowed two of what will be amongst the world's largest coal powered stations to be built, against the interests of all Africans in

the global warming threatened world. Additionally, the South African study provided a vignette of the future of the world's most vulnerable people, refugees. The country is the destiny of many of Africa's refugee population, people who have survived the hazards of trekking across the continent in search of a safe haven, to be then subjected to xenophobic attacks by almost as vulnerable poor, unemployed South Africans. These are the 'lost futures' of Africa – a flood of refugees now; with global warming, a tsunami further into this century.

In terms of using the South African study to help to develop my theoretical framework, this, as it transpired, proved to be most useful to me. I am aware that to have the theoretical part of a thesis following the empirical study is unusual. My original intention had been to have the study of South Africa as a 'case study' following the theoretical part and exemplifying certain issues from the theory. It was, however, as explained earlier (see section 1.1), on reading the comment from Samir Amin (1997 np) that South Africa is 'a kind of microcosm of the world capitalist system' that I could see that to use the study of this microcosm to further my understanding of the issues involved would be most fruitful when it came to building my theoretical frame.

The key headings in my theory emerged (even if not always under these headings) from the South African study: the metabolic rift and the carbon rift; alienation (in its various forms); capital accumulation; the role of the state, power, and financialisation. More substantially the study of and research on South Africa pushed me to accept two key considerations for the thesis. First, as I have sought to demonstrate, global warming is best seen as one of a suite of problems arising from capitalism and that to see it in isolation is conceptually and practically to misinterpret both the problem of global warming and the solutions to it. Second, what was then needed was a critique of capitalism, and that that was best achieved through a heavy reliance on Marxism.

13.3 Theory

Part III of the thesis turned to theoretical issues. It was argued that theory matters, particularly if one is to assess critically a system from within. This thesis drew explicitly and heavily on Marxist ecological theory in providing a framework for answering the question of whether capitalist institutions could solve the problem of global warming. In approaching the theoretical heart of the thesis, I argued that it was particularly important to establish the significance of Marxist theory in discussing such a complex, historically, and ideologically anchored issue as global warming. This is primarily in juxtaposition to the fact that global warming is too often elsewhere being conceptualised in isolated and normative terms as a market failure, requiring market or neoliberal solutions.

Having provided argument and evidence of why neoliberal institutions cannot solve the problem of global warming, the thesis examined first of all the paradigmatic frameworks within which global warming has been contextualised. What is immediately striking from much of the literature on global warming is how a-theoretical it is and how unquestioning it is of the wider political economy context. In other words, a covert ideological position – that of the hegemonic *status quo* – forms the conceptual context of much (global warming) literature and mainstream political discussion, including the arenas of sustainability policy and politics. Challenging this conceptualisation is central to the thesis and marks the importance of theory and methodology to the thesis, in its analysis and in its conclusions.

The critique of capitalism presented was both broad and selective. It had to be broad to capture the essential ingredients of capitalism: growth, social relations of production, the metabolic rift, the carbon rift, alienation, institutions such as states and markets but also particular features of neoliberal capitalism, financialisation and the rise and power of corporations. These aspects of the theoretical criticism of capitalism emphasised focal points to illustrate the argument that capitalism is not sustainable and cannot support an effective

solution to global warming. It had to be selective to retain the ideas at a manageable length.

Central to the whole thesis is the realisation and demonstration that this system of political economy is not only the context in which global warming has arisen; it is the *cause* of global warming. This phenomenon has occurred as a direct result of the insatiable appetite of fossil-fuelled economic activity for more and more resources which pollute the planet with more and more waste products, and the atmosphere with various greenhouse gases.

Once the theoretical conceptual basis of the thesis was laid out, I moved to examine significant components of the global capitalist system to understand and critique that system and show how its structures precluded not only effective action on global warming, but also more generally the possibility of a sustainable model of human development. In this section I drew on Marx and Marxist writings to give a historical materialist account of global warming, arguing that it was a product of the social relations of production and the processes of accumulation and expansion of capital. Marx built this part of his more general critique around the notions of primitive accumulation and the expropriation of the commons (the privatisation of land, forests, water, air) and hence the expropriation and dispossession of the people and their means of subsistence. Here, as was identified, is the foundation for the capitalist relations of production and capital accumulation. It is this capitalist imperative to accumulate and to grow that allowed the major conclusion of the thesis: that no reform of the capitalist system will ever enable it to be sustainable.

The centre-piece of the theoretical chapters however was around the concept of the metabolic rift, the rift caused by the systemic separation of humans from the environment in the fundamental relationship of humans' producing their livelihoods. The thesis argued that it is at this point that the rift, which has led to global warming and the myriad of other environmental problems, has its basis. This represents the breaking of the natural organic metabolism between human beings and nature. The thesis has argued that it is this metabolic rift which is the crux of the ecological critique of capitalism as an unsustainable

model of political economy. This rift constitutes two parts. There is the material rift between humans and the environment (of which humans of course are a part), between town and country and, as capitalism expanded, between coloniser and colonised. Secondly there is the rift in social relations between the owners of the means of production and labour. This latter division in social relations is captured by the notion of the class divide, between the owners of the means of production and alienated labour. Today, alienated labour includes the growing pool of unemployed and dispossessed from any form of adequate means of survival.

The thesis has argued that by understanding Marx's analysis of humans' metabolic relationship with the broad ecology and the disjuncture which occurs as a result of the capitalist exploitative relations of production, we can gain a deep and thorough understanding of the structural basis of environmental problems including global warming. Thus the historical materialist theory of the metabolic rift and the centrality of fossil fuels to capitalist production give a very clear and comprehensive account of the causative relationship between capitalism and global warming. The metabolic rift which occurred in the transformation from feudal to capitalist agriculture in England continues to spread and deepen today with the expansion of the capitalist system. As the thesis has exposed, the plunder which occurred during the colonial era is maintained in many forms, through the unregulated flow of capital from the periphery to the centre, through the expansion and activities of industrial and financial conglomerates and agribusinesses in peripheral countries, through land grabs and, most recently, through neoliberal solutions to global warming such as using the Clean Development Mechanisms and Reducing Emissions from Deforestation and Forest Degradation (REDD) offsetting schemes. (For a discussion on global land grabs see Harcourt 2011.) Such plundering of peripheral nations and peoples continues the historical process of dispossessing people of their lands and bringing social and ecological destruction in its wake. This de-peasantisation and its corollary, the proletarianisation of the periphery, is particularly common throughout the African continent, with South African history and contemporary South African political and economic activities providing both momentum and witness to this process.

This thesis also argued that the rift between centre and periphery has today two very broad spatial configurations. First is the centre-periphery divide, with the centre being the nexus of power and wealth held by the U.S., Europe and Japan (with China rising) triangle, with resources and wealth flowing from the South (Africa, Asia, South America) back to the centre, the centre being not so much a geographic location as a centre of accumulation, wealth and power. The second is the division within nation states between the powerful and wealthy elites and the majority of the populations, many of whom constitute the exploited and unemployed. Elites the world over have a commonality of purpose that binds them together on the macro structural arrangements in the globalisation process, constituting in effect a global plutocracy. It was argued that in the face of global warming, this plutocracy has no interest in supporting or leading transformational change that would bring about a sustainable global economy as it would necessarily bring to an end their power and wealth. It is this plutocracy which dominates the global institutions such as the IMF, the World Bank and the WTO. This is the same elite who oversaw the transfer of enormous public wealth to the private pockets of the already rich during the economic crisis of 2008-2009, a crisis which continues to afflict the global majority into 2010/2011. This is the same elites who in turn dominated the Kyoto climate change negotiations.

The thesis has argued that it is the deliberate efforts of this elite to have global warming perceived as an isolated problem which has been a major factor in helping to obfuscate both its causes and solutions and to prevent it from being conceptualised as a systemic problem. A central finding of the thesis has been that both governments' inaction and neoliberal approaches to solving global warming are to a large extent a rational outcome of a positivist hegemonic framework for conceptualising the world and global warming. Beyond this, neoliberal responses to global warming are little more than a form of denialism of the systemic causes of global warming, driven by global elite whose interests are served by maintaining the *status quo*.

13.4 A new world order?

From the critique of capitalism (in relation to global warming), the thesis turned to solutions. These, it was argued, necessarily require systemic transformational change. The thesis has shown that the momentum of capitalism is great, with considerable ability to adapt, absorb and reconfigure and to turn obstacles into profitable opportunities but all the time expanding and increasing the consumption of material resources from nature. It has been demonstrated that we are coming to a time in human history which marks the end of an epoch – the Holocene Epoch of the last 12,000 years, the geological period within which human civilisation has developed - when the Earth's biosphere has been conducive to supporting the flourishing of the human species. Anthropogenic global warming threatens to end this period.

It is not to date so much global warming, but the growing poverty in the face of growing riches, the disappearance of commons, the loss of lands and livelihoods as capitalism expands, that is resulting in increasing numbers of people having little to lose in changing the system (Narain 2011). As Foster *et al.* (2010: 439) write, 'the main force for ecological revolution stems from movements in the global South, marked for example, by the growth of the *Via Campesina* movement, socialist organisations like Brazil's MST, and ongoing revolutions in Latin America (the ALBA countries) and Asia (Nepal)'. The thesis also identified as relevant here the movements that come under the banner of the World Social Forum, a forum of particular significance to African social and environmental justice groups which lack the visibility of some of their Latin American counterparts. I have argued that the most likely agents for change are to be found in the poor majority populations of the developing countries, thus endorsing the view of Foster *et al.* (2010: 440) that 'it is conceivable that the main historic agent and initiator of a new epoch of ecological revolution is to be found in the Third World masses most directly in line to be hit first by the impending disasters.'

It is however unrealistic to conclude as Foster *et al.* (2010: 440) would want to do that the 'weight of environmental disaster is such that it would cross all

class lines and all nations and positions leading to a rejection of the engine of destruction in which we live'. Nearly twenty million people were affected by devastating floods in Pakistan in August 2010 – and the world stood by; Haiti lost more than 200,000 people in an earthquake at the beginning of 2010 and a year later people are still living without water, toilets, shelter and adequate food and dying from cholera while U.S. business interests maintain a system which continues to impoverish and disenfranchise the people of Haiti (Field and Bell 2010).

Solutions to global warming will have to address the gamut of related social and environmental problems arising from capitalism, at the same time as tackling global warming. The criticisms of capitalism used in the thesis are based primarily on the work of Marx. It is noted, however, that neither Marx, nor Engels, provided a detailed blueprint for future society. However, their vision does allow the thesis to develop on the basis of the principle of sustainable human development, drawing on metabolically restorative processes and the dis-alienation of the social relations of production. It is argued that justice and equity will have to prevail as foundational principles for future global society and this will necessarily be expressed through various institutional and cultural arrangements. These principles will, among other things, mean the issue of rights to future carbon emissions and historical ecological debt will have to be resolved, taking into account historical emissions and involving the contraction and convergence of carbon emissions globally. Future societies will need to build their economies on equitable ecological footprints within the restorative capacities of the Earth's biosphere.

It was argued that the struggle for a metabolically restorative and dis-alienated sustainable world will be violently resisted by vested class interests. The struggle to bring about solidarity amongst the impoverished, fragmented, alienated and exploited class alone will be a major undertaking but it is here that hopes lie. Samir Amin (2011) argues for a 'convergence in diversity' of all oppressed and exploited people to form a new international open and flexible organisation to co-ordinate opposition movements around the world. While strongly defending localisation and diversity, the thesis concludes that the

struggle is against a hegemonic globalised system and that global solidarity will be important in over-throwing this system, while building sustainable communities locally.

Marx and Engels' vision of the commons, of the dis-alienation of labour, of metabolically restorative relations between humans and nature in the production of livelihoods, and of common property as bases of socially sustainable communities, foreshadows a future with the potential for hope. This vision encompasses what the biological sciences tell us is possible and the social sciences tell us about humane human nature which is healthy and convivial. There are few grounds for optimism that global society will be able to or willing to make the necessary radical political economy changes in time to avert global warming. Yet, given the enormous suffering which has begun and will continue to grow as a result of global warming, there is a moral imperative to try to divert the course of human history on to a pathway that is just and enduring. It might seem idealistic to have concluded the thesis with a belief that transformational change is possible. There is, however, no presentation of a blueprint for future societies. That was never the intent of this thesis. To propose a blueprint for future societies would be contradictory. Given the importance the thesis has ascribed to cultural and economic diversity, to human creativity and to human societies developing their own histories, it would also have been inappropriate and pretentious to propose such a blueprint.

What the thesis did do however was to propose a set of principles as foundation stones for new sustainable societies which can lead to just, equitable, disalienated, culturally rich and materially secure societies. These also fit within the parameters of Marx's metabolically restorative, dis-alienated relations of production. What is clear from the thesis is that such epochal transformation is contingent on community and class solidarity, an agreed set of guiding principles, critical political conscientisation and trial and error experiences of struggle in building community-centred radical movements.

In addition to proposing core principles – what I have called a constitution - within this paradigm for future societies, the thesis indicates how some transformational changes have taken place in the last few decades. It was suggested that we can learn from these for future change processes. The thesis also presented examples of what can be achieved when communities or nations decide to build a just and enduring society.

What the thesis makes abundantly clear however is that effective change will only come from the majority who through their struggles for more equitable and environmentally sustainable lives build a powerful transnational base rooted in local cultures and economies, spreading the vision that another world is possible. The Marxist vision of the dis-alienation of the social relations of production has much to contribute to a framework for this movement. However, the negative experiences of state socialism and communism in the 20th century support the argument for local communities being the foundation of such a framework for human development. Localised food security (water and shelter) will be a predominant focus of economic activity in future communities, as the point of inextricable connection between humans and the environment. This human/environment relationship must be metabolically restorative, with social use rather than ownership of nature. Localised food production will also be the basis for building social institutions which support sustainable lifestyles, for supporting and building cultures which are life-affirming and politically critically conscientising of its members so people can realise their full potential as human actors. Communal (rather than individual) needs must be centre stage, not only of present but also of future generations. The needed ecological transformation requires the distribution of benefits according to community need. Indeed the institution of the community emerges very firmly as central to these new societies. This means focusing on first and foremost the collective needs of food production, education, recreation and public health. This will mean reconceptualising Marx's vision of socialism/ communism.

The demand for more equitable and environmentally sustainable life opportunities is central to the growing worldwide rebellion against dominant

economic institutions (transnational corporations, the unholy trinity of the IMF, the World Bank and the WTO). Communities built on the realisation of humans' dependence on the environment have the potential to develop a sense of solidarity across cultures as well as to develop a political consciousness.

The future holds only two possibilities. First, ecological destruction; the second, radical, systemic, transformative, epochal change. This is a provocative call but the latter is the only possibility which promises a future for humanity.

During times of war and times of crisis, the best in people can be brought out and a sense of sacrifice and solidarity built. There has never been a time when that sense of sacrifice and global solidarity is more needed. Those who have contributed least to causing the crisis, the ones whose lives are already the most vulnerable, are the very ones who will suffer first and most, but in the end all people and societies will be affected. We in the West have a moral obligation to address the huge ecological debt owed to the poor and the unborn which arises from the super-exploitation and pollution of the biosphere. It is a debt that must be addressed and paid through reparations, redistribution or compensation as an integral part of international climate negotiations. Only by addressing this issue can the West hope to build the essential cooperative alliance with all countries and peoples to tackle carbon emission reductions and the myriad of other social and ecological crises which confront humanity.

We have a small window of opportunity in which we can have both the hope and the power to change the disastrous trajectory we are on. We can choose to fiddle while the globe burns, to be afraid to be called alarmists, to be secure in the knowledge that we in the West will not be so immediately and devastatingly affected by global warming. That however would leave us morally bankrupt and living in a sea of chaos on a stricken planet.

The task is monumental and complex. The lives of nearly seven billion people who share a finite planet, enveloped and interconnected through a thin layer of fragile biosphere - our global commons – are at stake. Any addressing of this

task demands that we heal the deep structural chasm that has developed in the metabolic relations between humans and nature as a result of the social relations of production inherent in the capitalist system. We can do this by building new political, economic and cultural systems and societies that are metabolically restorative, equitable, resilient, just and democratic. It is a challenge that could bring the different peoples of the world together, to build something better together and make history for the benefit of all people. We cannot afford to fail.

References

- AAP (2010) Gov't appoints business panel. The Age. October 18.
<http://news.theage.com.au/breaking-news-national/govt-appoints-business-panel-20101018-16pex.html> Accessed April 2011.
- Abbas, H. and N. Ndeda (2009) Aid and reparations: power in the development discourse. In: Aid to Africa: Redeemer or Colonizer? Eds. H. Abbas and Y. Niyiragira. Cape Town: Pambazuka Press: 76-92.
- ABC Four Corners (2009) The Coal Nightmare. 7 September.
- Accion Ecologica (2009) <http://www.accionecologica.org/> Accessed May 2011.
- Africascan (2008) Josefsson, Eskom bonuses questioned. 27 May.
<http://www.africascan.com/node/3195> Accessed May 2011.
- Agarwal, A. and S. Narain (1991) Global Warming in an Unequal world: A Case of Environmental Colonialism. New Delhi: Centre for Science and Environment.
- Aleklett, K. (2010) Oil Shock: Peak oil and Australia's vulnerability. Public lecture. Perth: The Greens WA.
- Amandla (2010) Crises of Civilisation Conference. Cape Town: Amandla Publishers. <http://www.amandlapublishers.co.za/crisis-of-civilisation-conference> Accessed March 2011.
- Amin, S. (1992) Empire of Chaos. New York: Monthly Review Press.
- Amin, S. (1997) Samir Amin's 1997 Babu Memorial Lecture.
<http://www.pambazuka.org/en/issue/451> Accessed March 2011.
- Amin, S. (2006) Beyond Liberal Globalisation: A Better or Worse World?
Monthly Review Vol. 58 Issue 7. December
<http://monthlyreview.org/2006/12/01/beyond-liberal-globalization-a-better-or-worse-world> Accessed January 2011.

- Amin, S. (2009) The World We Wish to See. New York: Monthly Review Press.
- Amin, S. (2011) Capitalism in crisis: An obsolete system. Pambazuka News. <http://www.pambazuka.org/en/category/features/69276> Accessed March 2011.
- Anderson, K. and A. Bows (2011) Beyond 'dangerous' climate change: emission scenarios for a new world. Philosophical Transactions of the Royal Society **369** (1934): 20-44.
- Andreasson, S. (2010) Africa's Development Impasse. Rethinking the Political Economy of Transformation. London: Zed Books.
- Anteneh, N. T., D.G. Mekala, P. Mini, C.Mukirisa, *et al.* (2004) Goat production and livelihood systems in Sekhukhune District of the Limpopo Province, South Africa: Opportunities for commercialising goats and their by-products. www.icra-edu.org/objects/public_eng/FinalFS_SA_2006.pdf Accessed March 2011.
- Arief, A., M. Weiss, and V. Jones. (2010) The Global Economic Crisis: Impact on Sub-Saharan Africa and global policy responses. April 6. Congressional Research Service. <http://www.fas.org/sgp/crs/row/R40778.pdf> Accessed February 2011.
- Ashman, S., B. Fine and S. Newman. (2010) The crisis in South Africa: Neoliberalism, financialization and uneven and combined development. Socialist Register **47**.
- Ashton, P. (2009) Ecological Indicators Being Developed for the Waterberg Prior to Large-Scale Coal Mining. Johannesburg: CSIR (Council for Scientific and Industrial Research).
- Bagchi, A. K. (2005) Perilous Passage: Mankind and the Global Ascendancy of Capital. Oxford: Rowman & Littlefield.
- Ballaam, D. and M. Veseth. (2005) Introduction to International Political Economy. New Jersey: Prentice Hall.

- Banks, D. and J. Schäffler (2006) The Potential Contribution of Renewable Energy in South Africa. Johannesburg: Earthlife Africa.
- Banuri, T. (1993) The landscape of diplomatic conflicts. In: Global Ecology. Ed. W. Sachs. London: Zed Books: 47-67.
- Baran, P. A. and P. M. Sweezy (1966) Monopoly Capital: An Essay on the American Economic and Social Order. New York: Monthly Review Press.
- Barrett, S. (1994) Strategic environmental policy and international trade. Journal of Public Economics **54** (3): 325-338.
- BBC News. (2009) Japanese man marries virtual bride from dating game. <http://news.bbc.co.uk/2/hi/8419368.stm> Accessed March 2011
- Beder, S. (2006) Suining Themselves: How Corporations Drive the Global Agenda. London: Earthscan.
- Beder, S. (2006a) Environmental Principles and Policies: An Interdisciplinary Approach. Sydney: UNSW Press.
- Black, R. (2010) 2009 carbon emissions fall smaller than expected. BBC. 21 November. <http://www.bbc.co.uk/news/science-environment-11799073> Accessed March 2011.
- Boko, M., I. Niang, C. Nyong, A. Vogel, *et al.* (2007) Africa. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Fourth Assessment Report of the IPCC. Cambridge: Cambridge University Press: 433-467.
- Bolin, B. J. Houghton, G. Filho, R. Watson, *et al.* (1995) IPCC Second Assessment: Climate Change 1995. A Report of the Intergovernmental Panel on Climate Change. <http://www.ipcc.ch/pdf/climate-changes-1995/ipcc-2nd-assessment/2nd-assessment-en.pdf> Accessed March 2011.
- Bond, P. (2000) Elite Transition: from Apartheid to Neoliberalism in South Africa. Pietermaritzburg: University of Natal Press.

- Bond, P. (2002) Unsustainable South Africa. Environment, Development and Social Protest. Pietermaritzburg: University of Natal Press.
- Bond, P. (2003) Against Global Apartheid. South Africa Meets the World Bank, IMF and International Finance. Cape Town: UCT Press.
- Bond, P. (2006) Looting Africa. The Economics of Exploitation. London: Zed Books.
- Bond, P. (2007) Privatization of the air turns lethal: “Pay to Pollute” principle kills South African activist Sajida Khan. Capitalism, Nature, Socialism **18** (4): 6-37.
- Bond, P. (2008) From false to real solutions for climate change. 6 January. Monthly Review. <http://www.monthlyreview.org/mrzine/bond060108.html> Accessed April 2011.
- Bond, P. (2010) South Africa’s bubble meets boiling urban social protest. Monthly Review **62**(2).
- Bond, P. (2010a) Eye on civil society. The bank loan that could break SA's back. 13 April. Monthly Review. mrzine.monthlyreview.org/2010/bond130410.html Accessed March 2011.
- Bond, P. (2011) From Cairo to Dakar to Durban, another world actually is possible! Socialist Project E-Bulletin No. 464 February 16. <http://www.unionbook.org/profiles/blogs/patrick-bond-cairo-dakar> Accessed March 2011.
- Bond, P. Ed. (2011a) Durban’s Climate Gamble. Pretoria: UNISA Press.
- Bond, P., R. Dada, *et al.* Eds. (2009) Climate Change, Carbon Trading and Civil Society. Scottsville: University of Kwa Zulu Natal Press.
- Bond, P., G. Dor, *et al.* (2002) Unsustainable South Africa. Pietermaritzburg: University of Natal Press.

- Bond, P. and D. D'Sa (2010) Taking on World Bank over Eskom. 7 April.
<http://www.wdm.org.uk/blog/world-bank-coal-loan-south-africa-no-thanks>
 Accessed February 2011.
- Bond, P. and G. Erion (2009) South African carbon trading: A counterproductive climate change strategy. In: Electric Capitalism. Ed. D.A. McDonald. Cape Town: Earthscan: 338-358.
- Boulding, K. (1966) The Economics of the Coming Spaceship Earth.
<http://www.panarchy.org/bouldfing/spaceship.1966.html> Accessed February 2011.
- Boyce, J. and Ndikumana, L. (2002) Africa's Debt: Who Owes Whom? Political Economy Research Institute. November.
<http://www.odiousdebts.org/odiousdebts/index.cfm?DSP=content&ContentID=7129> Accessed January 2010.
- Boyce, J. and L. Ndikumana (2010) New Estimates of Capital Flight from Sub-Saharan African Countries: Linkages with External Borrowing and Policy Options. Working Papers 66, Political Economy Research Institute, University of Massachusetts at Amherst. <http://ideas.repec.org/p/uma/periwp/wp166.html> Accessed March 2011.
- Boyle, B. (2010) Eskom loan must not benefit ANC. April 4.
<http://www.timeslive.co.za/sundaytimes/article385071.ece/Eskom-loan-must-not-benefit-ANC> Accessed March 2011.
- Bradshaw, D. (2008) Determinants of health and their trends. South African Health Review. Primary Health Care in South Africa: A Review of 30 Years since Alma Ata. Durban: The South African Medical Research Council.
- Braverman, H. (1974) Labour and Monopoly Capital: The Degradation of Work in the Twentieth Century. New York: Monthly Review Press.
- Brundtland, G. H. (1987) Report of the Brundtland Commission, Our Common Future. Oxford: Oxford University Press.
- Bryceson, D.F. (2002) The scramble in Africa: Reorienting rural livelihoods. World Development **30**(5): 725- 39.

- Buffett, W. (2002) Chairman's letter to Berkshire Hathaway Inc.
www.berkshirehathaway.com/letters/2002pdf.pdf Accessed March 2011.
- Buhlungu, S., J. Daniel, *et al.* Eds. (2007) State of the Nation: South Africa 2007 226-44. Cape Town: HSRC Press.
- Burkett, P. (1999) Marx and Nature: a Red and Green Perspective. New York: St Martin's Press.
- Burkett, P. (2006) Marxism and Ecological Economics. Toward a Red and Green Political Economy. Leiden: Brill Academic Publishers.
- Burkett, P. and J. Foster. (2006) Metabolism, energy, and entropy in Marx's critique of political economy, Theory and Society **53**: 109-156.
- Buscher, B. (2009) Connecting political economies of energy in South Africa. Energy Policy **37** (10): 3951-3958.
- Caldicott, H. (2006) Nuclear Power is Not the Answer. Carlton: Melbourne University Press.
- Callinicos, A. (2009) Imperialism and Global Political Economy. Cambridge: Polity.
- Canadell, J. G., C. Le Quéré, M. Raupach, C. Field, *et al.* (2007) Contributions to accelerating atmospheric CO₂ growth from economic activity, carbon intensity, and efficiency of natural sinks. PNAS (Proceedings of the National Academy of Sciences - USA) **104** (47): 18866-18870.
- Carnegie, D. (2007) SARB Monetary Policy and South African Financialization <http://www.progressive-economics.ca/wp-content/uploads/2007/06/carnegie.pdf> Accessed May 2011.
- Carson, R. (1962) Silent Spring. Harmondsworth: Penguin Books in association with Hamish Hamilton.
- Catanzaro, J. (2008) Hunger fear for millions in biofuels push. Perth: The West Australian. 28 April: 7.

Chabal, P. (2009) Africa: The Politics of Suffering and Smiling. London: Zed Books.

Chachage, S. L. C. and E. Annan-Yao (2004) Conclusion - Future Agenda: Beyond Globalisation. In: Globalisation and Social Policy in Africa. Eds. A. Aina, S. L. C. Chachage and E. Annan-Yao. Oxford: Council for the Development of Social Science Research in Africa.

Chan, M. (2009) Subprime Carbon? Re-thinking the World's Largest New Derivatives Market. Washington: Friends of the Earth.

Chang, H-J. (2008) Bad Samaritans. The Myth of Free Trade and the Secret History of Capitalism. New York: Bloomsbury Press.

Chomsky, N. (1979) For Reasons of State. London: The New Press.

Chomsky, N. (2003) Hegemony or Survival. Crows Nest: Allen & Unwin.

Chomsky, N. (2010) The centre cannot hold: rekindling the radical imagination. The Crisis This Time. Socialist Register 2011. L. Panitch, G. Albo and V. Chibber. Pontypool: Wales.

Christensen, J.H., B. Hewitson, *et al.* (2007): Regional Climate Projections. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Eds. S. Solomon, D. Qin, *et al* Cambridge: Cambridge University Press.

CJSA (2010) Climate Justice in Durban: build our movement for COP 17! www.climate-justice-now.org/.../2010/.../Climate-Justice-in-South-Africa Accessed March 2011.

Clark, B. and J. B. Foster (2007) Is the new UN global warming report too conservative? Monthly Review.
<http://mrzine.monthlyreview.org/2007/cf170207p.html> Accessed March 2011.

Clark, B. and R. York (2005) Carbon metabolism: Global capitalism, climate change and the biospheric rift. Theory & Society **34** (4): 391-428.

- Clark, B. and R. York (2008) Rifts and shifts: Getting to the root of environmental catastrophe. Monthly Review **60** (6): 13-24.
- Clarke, M. (2003) Haiti: Enslaved by debt. Jubilee USA Network. http://www.thirdworldtraveler.com/Caribbean/Haiti_Enslaved_Debt.html Accessed March 2011.
- Clarke, R. (2007) UN Climate Conference: Prepare for a 'bluewash'. Green Left Weekly: Broadway, NSW: 14-15.
- Clarke, R. (2010) Why James Hansen is wrong on nuclear power. Links. 8 April. <http://links.org.au/node/1607> Accessed March 2011.
- Cleary, S. (2009) Health Economics Unit, University of Cape Town. Personal communication.
- Coal of Africa (2010) Report for Quarter Ended 31 December. http://www.coalofafrica.com/IMG/pdf/Microsoft_Word_-_CZA_Report_for_the_quarter_ended_FINAL_FOR_SENS-2.pdf Accessed March 2011.
- Confalonieri, U., B. Menne, R. Akhtar, K. Ebi, *et al.* (2007) Human Health. Climate change 2007: impacts, adaptation and vulnerability. Contribution of Working Group II to Fourth Assessment Report of the Intergovernmental Panel on Climate Change. www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter8.pdf Accessed May 2010.
- Cotula, L., Dyer, N., and Vermeulen, S. (2008) Fuelling Exclusion? The Biofuels Boom and Poor People's Access to Land. IIED: London
- Conley, D. (2008) You May Ask Yourself: An Introduction to Thinking Like a Sociologist. New York: Norton and Company.
- Connell, D. (2009) The Political Economy of South Africa. Public lecture, June. Cape Town: University of Cape Town.
- Connell, R. (2007) Southern Theory. The Global Dynamics of Knowledge in Social Science. Crows Nest: Allen & Unwin.

- COSATU (2001) Central Executive Committee, Discussion Paper. Central Executive Committee: Political Discussion Paper July.
<http://www.cosatu.org.za/docs/discussion/2001/cecpol.htm> Accessed February 2011.
- Costello, I., M. Abbas, *et al.* (2009) Managing the health effects of climate change. The Lancet **373**: 1693-733.
- Cotula, L., N. Dyer, and S. Vermeulen (2008) Fuelling Exclusion? The Biofuels Boom and Poor People's Access to Land. London: FAO and IIED.
- Crawford, J. (2010) Eating topsoil to extinction.
<http://www.energyefficienthomedesign.com.au/2010/02/eating-topsoil-to-extinction/> Accessed March 2011.
- CSIR (2009) The inextricable link: climate change and our water resource. CSIR ScienceScope. <http://www.csir.co.za/publications/pdfs/Ch3120809.pdf> Accessed March 2011.
- Daily Mail Online (2010) Couple nurture their virtual child... and let their real baby daughter starve to death. 21 February. www.dailymail.co.uk/.../Couple-nurture-virtual-child--let-real-daughter-starve-death.html Accessed February 2011.
- Daily News (2010) Eskom's 'Sweetheart Deals'. March 3.
www.cbn.co.za/index.php?Page=daily&daily_4441 Accessed April 2011.
- Darwin, C. (1859) The Origin of Species. London: Murry.
- Das, S., S. Khuluse, *et al.* (2008) A Risk-Based Approach to Assessing Climate Impacts. Cape Town: CSIR Built Environment.
- Dasgupta, P. (2010) A Matter of Trust: Social Capital and Economic Development
http://www.sci.manchester.ac.uk/medialibrary/sci_discussionpaper_no1.pdf Accessed April 2011.
- DEAT (2004) A National Climate Change Response Strategy for South Africa. Pretoria: Department of Environmental Affairs and Tourism (South Africa).

DEAT (2007) Long Term Mitigation Scenarios. Cape Town: Energy Research Centre, University of Cape Town.

Delius, P. (2007) Introduction. In: Mpumalanga: History and Heritage. Ed. P. Delius. Scottsville: University of Kwa-Zulu-Natal Press.

Dembele, D. M. (2007) The International Monetary Fund and World Bank in Africa: A "disastrous" record. In: Neoliberalism, Globalization and Inequalities: Consequences for Health and Quality of Life. Ed. V. Navarro. Amityville, NY: Baywood Publishing Company: 369-377.

Desai, A. (2002) We Are the Poors. New York: Monthly Review Press.

Desai, A. (2004) But we were thousands: Dispossession, resistance, repossession and repression in Mandela Park Journal of Asian and African Studies August **39**: 239-269.

Devarajan, S. (2010) Africa Development Indicators 2010. Washington: World Bank.

Department of Minerals and Energy (2010) Press Release. Johannesburg, South Africa. www.dmr.gov.za/ Accessed March 2011.

Diamond, J. (2005) Collapse: How Societies Choose to Fail or Survive. Camberwell: Penguin.

Direct Action (2009). Cuba's revolution: 50 years of accomplishments. Issue 8. February.
http://directaction.org.au/issue8/cuban_revolution_50_years_of_accomplishments Accessed April 2011.

Dobb, M. H. (1973) Theories of Value and Distribution since Adam Smith: Ideology and Economic Theory. Cambridge: Cambridge University Press.

Duigan, S. (2009) Catholic Nun, Messina, Limpopo. Personal Communication.

- Earthlife Africa and O. International (2009) Climate change, development and energy problems in South Africa: Another world is possible.
<http://www.earthlife.org.za> Accessed March 2011.
- EIA (2010) Energy-related carbon dioxide emissions. International Energy Outlook. <http://www.eia.doe.gov/oiaf/ieo/emissions.html> Accessed March 2011.
- Ellman, M. (1997) The political economy of transformation. Oxford Review of Economic Policy **13** (2): 23-32.
- Energy Watch Group (2006) Uranium resources and nuclear energy.
http://www.energywatchgroup.org/fileadmin/global/pdf/EWG_Report_Uranium_3-12-2006ms.pdf Accessed March 2011.
- Engels F (1947) Anti-Dühring. Herr Eugen Dühring's Revolution in Science. Moscow: Progress Publishers.
- Epstein, G. (2006) Financialisation and the World Economy. Cheltenham: Edward Elgar.
- Epstein, H. (2002) The hidden cause of AIDS. The New York Review of Books 49 (8).
- Escobar, A. (1995) Encountering Development. The Making and Unmaking of the Third World. Princeton, New Jersey: Princeton University Press.
- Eskom (2008) Annual Report 2008. Pretoria: Eskom.
http://financialresults.co.za/eskom_ar2008/ Accessed June 2009.
- Eskom (2010) Annual Report, 2010. Pretoria: Eskom.
http://financialresults.co.za/2010/eskom_ar2010/ Accessed August 2010.
- Fanon, F. (1967) The Wretched of the Earth. Harmondsworth: Penguin.
- FAO (1996) Report of the World Food Summit. Rome: United Nation's Food and Agriculture Organisation.
- Fargione, J., J. Hill, *et al.* (2008) Land clearing and the biofuel carbon debt. Science 319 (5867): 1235-8.

- Fattal, J. (2006) Was Gandhi an anarchist? PeacePower
http://www.calpeacepower.org/0201/gandhi_anarchist.htm Accessed March 2011.
- Ferguson, A. (2008) Economies count the cost of derivatives. The Australian
<http://www.theaustralian.com.au/business/opinion/counting-cost-of-derivatives/story-e6frg9j6-111117783464> Accessed March 2011.
- Field, T. and B. Bell (2010) "Miami rice": The business of disaster in Haiti. Grassroots Online www.grassrootsonline.org/news/.../miami-rice-business-disaster-hai Accessed March 2011.
- Fig, D. (2007) Technological choices in South Africa: ecology, democracy and development. In: State of the Nation: South Africa 2007. Eds. S. Buhlungu, J. Daniel, *et al.* Cape Town: HSRC Press: 226-244.
- Fig, D. (2009) Nuclear energy rethink? The rise and demise of South Africa's Pebble Bed Modular Reactor. Institute for Security Studies.
<http://www.iss.co.za/uploads/210.pdf> Accessed March 2011.
- Fine, B. (2001) "Economic Imperialism": A view from the periphery. Review of Radical Political Economics **34** (2): 187-201.
- Fine, B. (2008) The Minerals-Energy Complex is dead: Long live the MEC? eprints.soas.ac.uk/5617/1/MineralEnergyComplex.pdf Accessed March 2011.
- Fine, B. and Z. Rustomjee (1996) The Political Economy of South Africa. From Minerals-Energy Complex to Industrialisation. London: Hurst & Company.
- Finger, M. (1993) Politics of the UNCED process. In: Global Ecology. Ed. W. Sachs. London: Zed Books: 36-48.
- Fiske, J. 1993 Power Plays. Power Works. New York and London: Verso.
- Flak, A. (2011) Government will ensure enough coal for Eskom. 16 February. Johannesburg: The Mail and Guardian. <http://mg.co.za/article/2011-02-02-govt-will-ensure-enough-coal-for-eskom/> Accessed March 2011.

- Flannery, T. (2005) The Weather Makers. Melbourne: Text Publishing.
- Flavin, C. (2008) Low-Carbon Energy: a Roadmap. Report 178. Washington: World Watch Institute.
- FOE (2009) Subprime Carbon? Re-thinking the world's largest new derivatives market. <http://www.foe.org.au/media-releases/2009-media-release/carbon-trading-the-next-sub-prime-new-report/> Accessed March 2011.
- FOE (2009a) A dangerous obsession: the evidence against carbon trading and for real solutions to avoid a climate crunch. Oxford: Friends of the Earth. www.foe.co.uk/resource/reports/dangerous_obsession.pdf Accessed March 2011.
- FOE (2009b) Submission to the National Carbon Offset Standard Discussion Paper. 27 February. Canberra: Friends of the Earth. www.climatechange.gov.au/.../submissions/.../submissions/.../ Accessed March 2011.
- FOE (2010) Africa: up for grabs: the scale and impact of land grabbing for agrofuels. <http://www.foei.org/en/resources/publications/pdfs/2010/africa-up-for-grabs> Accessed April 2011.
- Footprint Network (2009) Ecological trends and Africa's future: New report examines risks, opportunities. Oakland, Ca.: Global Footprint Network. www.footprintnetwork.org/en/index Accessed March 2011.
- Foster, J. B. (1999) Marx's theory of metabolic rift: Classical foundations for environmental sociology. American Journal of Sociology **105** (2): 366-405.
- Foster, J. B. (2000) Marx's Ecology. New York: Monthly Review Press.
- Foster, J. B. (2001) Ecology against capitalism. Monthly Review **53** (5).
- Foster, J. B. (2002) Ecology Against Capitalism. New York: Monthly Review Press.

- Foster, J. B. (2002a) Marx's ecology in historical perspective. International Socialism Journal <http://pubs.socialistreviewindex.org.uk/isj96/foster.htm> Accessed March 2011.
- Foster, J.B. (2008) Ecology and the transition from capitalism to socialism. Monthly Review. <http://monthlyreview.org/2008/11/01/ecology-and-the-transition-from-capitalism-to-socialism> Accessed April 2011.
- Foster, J. B. (2009) Ecology and the transition from capitalism to socialism. Monthly Review **60** (6). <http://www.monthlyreview.org/081110foster.php> Accessed April 2011.
- Foster, J. B. and B. Clark (2004) Ecological Imperialism. New York: Monthly Review Press.
- Foster, J.B. and B. Clark (2009) The Paradox of Wealth: Capitalism and Ecological Destruction Monthly Review **61** (6) <http://monthlyreview.org/2009/11/01/the-paradox-of-wealth-capitalism-and-ecological-destruction> Accessed April 2011.
- Foster, J. B., B. Clark, *et al.* (2008) Ecology: the moment of truth - an introduction. Monthly Review **60** (2).
- Foster, J. B., B. Clark, *et al.* (2010) The Ecological Rift. Capitalism's War on the Planet. New York: Monthly Review Press.
- Foster, J. B. and F. Magdoff (2009) The Great Financial Crisis: Causes and Consequences. New York: Monthly Review Press.
- Foster, J.B., R.W. McChesney and R.J. Jonna (2011) The global reserve army of labor and the new imperialism. Monthly Review **63** (6); 1.31.
- Frank, A. G. (1966) The Development of Underdevelopment. Boston, Mass.: New England Free Press.
- Franke, R. (2008) Local Planning: The Kerala Experiment. Real Utopia. C. Spannos Oakland (CA): Edinburgh: 130.
- Freire, P. (1970) Pedagogy of the Oppressed. New York: Continuum.

- Fukuyama, F. (1992) The End of History and the Last Man. London: Penguin.
- Furber, R., J. C. Warf, *et al.* (2008) The future of nuclear power. Monthly Review **59** (9): 38-48.
- Galbraith, J. K. (1996) The Good Society: The Humane Agenda. New York: Mariner Books.
- Gare, A. (2008) Marxism and the problem of creating an environmentally sustainable civilization in China. Capitalism, Nature, Socialism 19 (1): 5-26.
- Garfield, S. (2008) Why carbon trading will increase carbon pollution. Direct Action <http://directaction.org.au/issue6> Accessed March 2011.
- Garman, R. (2010) South Africa is becoming a high-carbon zone to attract foreign investment. London: The Guardian.
- Gentle, L. (2009) Escom to Eskom: From racial Keynesian capitalism to neo-liberalism (1910-1994). In: Electric Capitalism. Ed. D.A. McDonald. Cape Town: Earthscan: 50-72.
- Global Carbon Project (2010) Global carbon project figures. International Geosphere-Biosphere Programme (IGBP). www.globalcarbonproject.org/ Accessed April 2011.
- Global Exchange (2008) Top ten reasons to oppose the World Trade Organisation. <http://www.globalexchange.org/campaigns/wto/toptenwto2008.pdf> Accessed April 2001.
- Global Exchange (2009) Global economy 101. www.globalexchange.org/ Accessed April 2011.
- Global Footprint Network (2010) Living Planet Report 2010. Biodiversity, Biocapacity and Development. Oakland, California: Global Footprint Network in collaboration with the World Wildlife Fund.
- Goklany, I. (2011) Could biofuel policies increase death and disease in developing countries? Journal of American Physicians and Surgeons 16 (1).

Gore, A. (2006) An Inconvenient Truth. D. Guggenheim, Plantation Productions.

Gramsci, A. (1971) Selections from the Prison Notebooks. London: Lawrence and Wishart.

Greenberg, S. (2009) Market liberalisation and continental expansion: The repositioning of Eskom in post-apartheid South Africa. In: Electric Capitalism. Ed. D.A. McDonald. Cape Town: Earthscan: 73-108.

Griffin, T. (2010) The Impact of Mining on West Australian Conservation. Perth: Conservation Council of Western Australia.

Grobler, J. (2009) Testing democracy: which way is South Africa going? <http://www.scribd.com/doc/31603161/State-of-Democracy-in-South-Africa> Accessed November 2009.

Grobler, J. (2010) State mining an ANC figment. 28 June. Johannesburg: The Mail and Guardian.

Groenewald, Y. (2009) Digging for mining licences. 4 June. Johannesburg: The Mail and Guardian.

Groenewald, Y. (2010) Nuclear deal back on track. 5 March. Johannesburg: The Mail and Guardian. <http://mg.co.za/article/2010-03-05-nuclear-deal-back-on-track>. Accessed April 2011.

Groenewald, Y. (2010a) New twist in mine saga. 26 March. Johannesburg: The Mail and Guardian.

Groenewald, Y. 2011. Pledge to Kyoto the bottom line. Mail and Guardian August 05. <http://mg.co.za/article/2011-08-05-pledge-to-kyoto-the-bottom-line> Accessed November 2011.

Guha, R. (1990) Towards a cross-cultural environmental ethics. Alternatives 15: 431-47.

Gumede, W. (2007) Thabo Mbeke and the Battle for the Soul of the ANC. London: Zed Books.

- Hallowes, D. (2008) A critical appraisal of the LTMS.
www.earthlife.org.za/wordpress/wp-content/.../2008/12/ltms-final-web.pdf
 Accessed April 2011.
- Hallowes, D. (2009) The World Bank and Eskom: Banking on Climate Destruction. Pietermaritzburg: GroundWork.
www.groundwork.org.za/.../14Dec09EskomReport.asp. Accessed April 2011.
- Hallowes, D. and V. Munnik (2006) Poisoned Spaces: Manufacturing Wealth, Producing Poverty. October. Pietermaritzburg: Groundwork: 185.
www.groundwork.org.za/Publications/groundWorkReport2006.pdf Accessed March 2011.
- Hallowes, D. and V. Munnik (2009) World Bank and Eskom Report. June. Pietermaritzburg: Groundwork.
www.groundwork.org.za/Publications/worldbankeskom09.pdf. Accessed March 2011.
- Hamilton, C. (2003) Growth Fetish. Crows Nest: Allen & Unwin.
- Hamilton, C. (2007) Scorcher: the Dirty Politics of Climate Change. Melbourne: Black Inc.
- Hamilton, C. (2008) Six degrees of apocalypse. October. The Monthly.
<http://www.themonthly.com.au/books-clive-hamilton-six-degrees-apocalypse-recent-books-about-climate-change-1222> Accessed February 2011.
- Hansen, J. (2005) A slippery slope: how much global warming constitutes “dangerous anthropogenic interference”? Climatic Change 68: 269–79.
- Hansen, J. (2007) Scientific reticence and sea level rise. Environmental Research Letters 2 (024002): 6.
- Hansen, J., M. Sato, P. Kharecha, D. Beerling, *et al.* (2008) Target atmospheric CO₂: Where should humanity aim? Open Atmosphere Science Journal 2: 217-231.

Hansen, J. (2010) Storms of My Grandchildren. The Truth About the Coming Climate Catastrophe and our Last Chance to Save Humanity. Bloomsbury: London.

Hansen, J. and Sato, M. (2011) Paleoclimate Implications for Human-Made Climate Change (draft January 2011).
http://www.columbia.edu/%7Ejeh1/mailings/2011/20110118_MilankovicPaper.pdf Accessed June 2011.

Harcourt, G. (1998) University ideals and the market. Journal of Economic and Social Policy 3: 28-35.

Harcourt, G.C. and Kerr, P. (2009) Joan Robinson. Basingstoke: Palgrave Macmillan.

Harcourt, W. (2011) Editorial: No More Black Fridays. Development 54: 1–4; doi:10.1057/dev.2010.107; published online 17 December 2010
<http://www.palgrave-journals.com/development/journal/v54/n1/full/dev2010107a.html> Accessed April 2011.

Hardin, G. (1968) The tragedy of the commons. Science 162: 1243-1248.

Harvey, D. (2001) Spaces of Capital: Towards a Critical Geography. Edinburgh: Routledge.

Harvey, D. (2003) The New Imperialism. Oxford: Oxford University Press.

Harvey, D. (2005) A Brief History of Neoliberalism. New York: Oxford University Press.

Harvey, F. (2011) Worst ever carbon emissions leave climate on the brink. Record rise, despite recession, means 2C target almost out of reach. The Guardian. UK. 29 May.
<http://www.guardian.co.uk/environment/2011/may/29/carbon-emissions-nuclearpower> Accessed May 2011.

Hathaway, T. and L. Pottinger (2009) The great hydro-rush: the privatisation of Africa's rivers. In: Electric Capitalism. Recolonising Africa on the Power Grid. Ed. D. MacDonald. Cape Town: Earthscan: 149-179.

Hatty, P. (2009) Mopane Bush Lodge, Limpopo Province. Personal Communication.

Hawthorne, S. (2002) Wild Politics. North Melbourne: Spinifex Press.

Heinberg, R. (2007) Peak Everything: Waking Up to the Century of Decline in Earth's Resources. Gabriola Island: Clairview.

Hermansen, S. (2007) Samsø - a Renewable Energy Island. 10 years of Development and Evaluation. Strandengen: Samsø Energy Academy: 58.

Heusemann, M. H. (2003) The limits of technological solutions to sustainable development. Clean Technology and Environmental Policy 5: 21-34.

Hicks J.R. (1939) Value and Capital: An Inquiry into Some Fundamental Principles of Economic Theory. Oxford: Clarendon Press.
<http://www.pdfbooksdownloads.com/john-hicks-value-and-capital.html>.
Accessed May 2011.

Hightower, M. and S. Pierce (2008) The energy challenge. Nature **452** (7185): 285-286.

Hildyard, N. (1993) Foxes in charge of the chickens. In: Global Ecology. Ed. W. Sachs. London: Zed Books: 22-35.

Ho, M. (2008) Carbon capture and storage a false solution. www.iss.org.uk/CCSAFalseSolution.php Accessed March 2011.

Holmgren, D. (2009) Future Scenarios. White River Junction: Chelsea Green Publishing Company.

Hopkins, R. (2008) The Transition Handbook. Creating Local Sustainable Communities Beyond Oil Dependency. Sydney: Finch Publishing.

Huber, M. (2009) Energizing historical materialism: Fossil fuels, space and the capitalist mode of production. Geoforum **40** (1): 105-115.

Huffman, T. (2008). Climate change during the Iron Age in the Shashe-Limpopo Basin, southern Africa. Journal of Archaeological Science **35**: 2032-2047 Accessed April 2011.

Ibitayo, O. and W. C. G. Burns (2008) Transboundary dumping of hazardous waste. In: Encyclopedia of Earth. Ed. C. J. Cleveland. Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment.

Illich, I. (1981) Shadow Work. Boston: Marion Boyars.

Imberger, J. (2008) It's too late to beat climate change - just deal with it. Perth: The West Australian: 10-11.

Innes, D. (1984) Anglo American and the Rise of Modern South Africa. London: Heinemann.

International Energy Agency (IEA) (2010)
www.eia.doe.gov/cabs/South_Africa/Background.html Accessed April 2011.

IPCC (2000). IPCC Emissions Scenarios. A Special Report of Working Group III of the intergovernmental Panel on Climate Change. Eds. N. Nakicenovic N. and R. Swart. New York: Cambridge University Press.

IPCC (2007) Pachauri, R.K. and Reisinger, A. (Eds.) Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva: IPCC.

IPCC (2007a). Summary for Policy Makers. Climate Change 2007: the Physical Science Basis. Contribution of Working Group to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Eds. S. Solomon, D. Qin, D. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller. Cambridge: Cambridge University Press.

IPCC (2007b) Climate Change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Eds. M.L. Parry, O.F. Canziani,

- J.P. Palutikof, P.J. van der Linden & C.E. Hanson. Cambridge: Cambridge University Press.
- IUCN (2010) Numbers of threatened species by major groups of organisms. <http://www.iucnredlist.org/info/stats> Accessed April 2011.
- Jacks, M. (2010) Analysts sneer at coal-fired concerns. Eskom will use very clean technology say economists. Johannesburg, Business Report. www.busrep.co.za/index.php?fArticleId=5410040 Accessed April 2011.
- James, C. (2009) Against the current. Arena Magazine
- Jacobsen, M. (2008) Review of solutions to global warming, air pollution, and energy security. Energy and Environmental Science **2**: 148-174.
- Jevons, W.S. (1866) The Coal Question. London: Macmillan.
- Joubert, L. (2008) "Boiling Point" - the Impact of Climate Change in South Africa. Johannesburg: Wits University Press.
- Judd, D. (1996) EMPIRE: The British Imperial Experience from 1765 to the Present. London: Fontana.
- Kapur, A., N. Macleod, *et al.* (2005) Equity strategy. Plutonomy: buying luxury, explaining global imbalances, Citigroup 33. www.dandrader.com/Citigroup_Plutonomy.pdf Accessed April 2011.
- Kar, D. and K. Curcio (2011) Illicit financial flows from developing countries: 2000-2009. Update with a focus on Asia. Global Financial Integrity. http://www.gfip.org/storage/gfip/documents/reports/IFF2010/gfi_iff_update_report-web.pdf Accessed April 2011.
- Katz, A. (2007) The Sachs Report: Investing in health for economic development: or increasing the size of the crumbs from the rich man's table? In: Neoliberalism, Globalization and Inequalities. Ed. V. Navarro. New York: Baywood.

- Keen, S. (2010) Did Australia dodge the bullet or is there a toxic housing bubble? Canberra: Academy of the Social Sciences in Australia Annual Symposium. Family Fortunes and the Global Financial Crisis.
- Kenny, Z. (2007) When Pollution Means Profits. Broadway, NSW: Green Left Weekly: 13.
- Khator, R. and L. Fairchild (2005) The evolution of "sustainable development". In: Globalisation and Sustainable Development: Issues and Applications. Eds. R. L. Harris, Dr. Kiran C. Patel. Houston, Center for Global Solutions: University of South Florida.
- Kill, J. (2001) Sinks in the Kyoto Protocol: A Dirty Deal for Forests, Forest Peoples and the Climate. Brussels: Fern.
- Kincheloe, J. and P. McLaren. (2002) Rethinking critical theory and qualitative research. In: Ethnography and Schools: Qualitative Approaches to the Study of Education. Eds. Y Zou and E. Trueba. Lanham, Maryland: Rowman & Littlefield Publishers.
- Kirkpatrick, R. G., G. N. Katsiaficas, *et al.* (1978) Critical theory and the limits of sociological positivism. Archives of the Red Feather Institute Transforming Sociology Series. <http://www.mega.nu/ampp/176krkpt.htm> Accessed April 2011.
- Kitney, G. (2004) Selfish Australia votes for itself. Sydney: Sydney Morning Herald.
- Klare, M. (2008) Rising Powers, Shrinking Planet. The New Geopolitics of Energy. New York: Metropolitan Books.
- Klein, L. and M. Pomer, Eds. (2001) The New Russia The New Russia: Transition Gone Awry. Stanford, NJ: Stanford University Press.
- Klein, N. (2007) The Shock Doctrine. Camberwell: Allen Lane.
- Knudtson, P. and D. Suzuki (1992) Wisdom of the Elders. North Sydney: Allen & Unwin.

- Kolbert, E. (2006) Field Notes From A Catastrophe. London: Bloomsbury.
- Kothari, S. and P. Parajuli (2004) No nature without social justice: a plea for cultural and ecological pluralism in India. In: Global Ecology. Ed. W. Sachs. London: Zed Books.
- Landsberg, C. (2007) The AU, NEPAD and Mbeki's 'Progressive African agenda'. Johannesburg: The Mail and Guardian.
<http://www.mg.co.za/article/2007-06-18-the-au-nepad-and-mbekis-progressive-african-agenda> Accessed April 2011.
- Laski, H. (1933) Democracy in Crisis. London: George Allen and Unwin.
- Latham, B. (2011) Opposed by Environmental Groups. April 7.
<http://www.bloomberg.com/news/2011-04-07/environmental-groups-say-to-challenge-coal-of-africa-s-vele-water-license.html> Accessed May 2011.
- Lenton, T., H. Held, *et al.* (2008) Tipping elements in the Earth's climate system. Proceedings of the National Academy of Sciences of the United States of America. **105** (6): 1786-1793.
- Li Ching, L. (2010) Organic agriculture fights back. The Institute for Science and Society. <http://www.i-sis.org.uk/OrganicAgriculture.php> Accessed March 2011.
- Li, M. (2008) Climate change, limits to growth and the imperative for socialism. Monthly Review **60** (2).
- Linden, E. (2006) The Winds of Change: Climate, Weather and the Destruction of Civilizations. New York: Simon and Schuster.
- Lincoln, A. Letter to Col. William F. Elkins, Nov. 21, 1864 in Shaw, A. 1950 The Lincoln Encyclopedia New York: Macmillan.
- Liptak, A. (2010) Courts take on campaign finance decision. The New York Times. March 26.
<http://www.nytimes.com/2010/03/27/us/politics/27campaign.html> Accessed March 2011.

- Lohmann, L. (1999) The Dyson effect: carbon 'offset' forestry and the privatization of the atmosphere. The Corner House Briefing (15). www.wrm.org.uy/actors/CCC/Dyson2.html Accessed March 2011.
- Lohmann, L. (2004) Memorandum to the Inquiry into the International Challenge of Climate Change: UK Leadership in the G8 and EU. The Corner House, SinksWatch, Carbon Trade Watch.
- Lohmann, L. (2007) Conversation on Climate Change, Privatisation and Power. Development Dialogue, Dag Hammarskjold Foundation, No. 48. Durban: The Durban Group for Climate Justice and the Corner House.
- Lohmann, L. (2008) Six arguments against carbon trading. <http://climateandcapitalism.com/?p=544> Accessed April 2011.
- Lohmann, L. (2009) Climate as investment. Development and Change **40** (6): 1063-1083.
- Lovelock, J. (2006) The Revenge of Gaia. New York: Basic Books.
- Lynas, M. (2007) Six Degrees: Our Future On a Hotter Planet. Hammersmith: Fourth Estate.
- Magdoff, F. and B. Tokar (2009) Agriculture and food in crisis: an overview. Monthly Review. <http://monthlyreview.org/090701magdoff-tokar.php> Accessed March 2011.
- Magubane, B. (1979). The Political Economy of Race and Class in South Africa. New York: Monthly Review Press.
- Magubane, Z. (2004) Bringing the Empire Home: Race, Class, and Gender in Britain and Colonial South Africa. Chicago: The University of Chicago Press.
- Magubane, Z. (2004a) The revolution betrayed? Globalization, neoliberalism, and the post-apartheid state. The South Atlantic Quarterly **103** (4): 657-671.
- Mail and Guardian (2010) SA mothballs Pebble Bed Modular Reactor project. <http://mg.co.za/article/2010-09-17-sa-mothballs-pebble-bed-modular-reactor-project>. Accessed March 2011.

Makwana, M. (2010) Eskom passes the power buck.

www.miningmx.com/news/energy/eskom-passes-the-power-buck.htm

Accessed April 2011.

Mandel, E. (1979) Late Capitalism. London: NLB.

Mann, C. (2008) World Bank criticized for helping fossil fuel plants. New York: The International Herald Tribune.

Marais, H. (2001) South Africa: Limits to Change - the Political Economy of Transition. Cape Town: UCT Press.

Marcuse, H. (1964) One Dimensional Man. Boston: Beacon Press.

Marcuse, H. (1967) The End of Utopia.

<http://www.marxists.org/reference/archive/marcuse/works/1967/end-utopia.htm>. Accessed March 2011.

Martinez-Alier, J. (1999) From political economy to political ecology. In: Bioeconomics and Sustainability. Eds. K. Mayumi and J.M. Gowdy. Cheltenham: Edward Elgar.

Martinez-Alier, J. (2007) Marxism, social metabolism and international trade. In: Rethinking Environmental History. Eds. A. Hornborg, J.R. McNeill, and J. Martinez-Alier, J. New York: Altamira Press: 221-238.

Marx K. (1847) The Nature and Growth of Capital

<http://www.marxists.org/archive/marx/works/1847/wage-labour/ch05.htm>

Accessed May 2009.

Marx, K. (1894) Capital Vol III. Part VI. Transformation of Surplus-Profit into Ground-Rent. Chapter 47. Genesis of Capitalist Ground-Rent.

<http://www.marxists.org/archive/marx/works/1894-c3/ch47.htm> Accessed June 2010.

Marx, K. (1954) Capital Vol. 1. A Critical Analysis of Capitalist Production. Moscow: Foreign Languages Publishing House.

Marx, K. (1963) Karl Marx: Early Writings From T.B. Bottomore, Ed. and Trans; 120-134. New York: McGraw-Hill.

- Marx, K. (1970) Capital: A Critique of Political Economy, Vol. 3. New York: Vintage.
- Marx, K. (1971) Theories of Surplus-Value. Moscow: Progress Publishers.
- Marx, K. (1976) Capital: A Critique of Political Economy, Vol. 1. London: Penguin Classics.
- Marx, K. (1981) Capital: A Critique of Political Economy, Vol. 1. New York: Vintage.
- Marx, K. (1981) Capital: A Critique of Political Economy, Vol. 111. New York: Penguin.
- Matthews, C. (2009) NGOs oppose CoAL's Vele mine. The Mining Weekly. www.miningweekly.com Accessed March 2011.
- Mayhew, P, Jenkins, G.B., *et al.* (2008) A long-term association between global temperature and biodiversity, origination and extinction in the fossil record. Proceedings of the Royal Society. **275** (1630): 47-53.
- MBendi Information Services (2010) Mining in South Africa - Overview. 25 November. www.mbendi.com Accessed April 2011.
- McClintock, N. (2010) Why farm the city? Theorizing urban agriculture through a lens of metabolic rift. Cambridge Journal of Regions, Economics and Society **3** (2): 191-207.
- McDonald, D.A. (2009) The importance of being electric. In: Electric Capitalism. Recolonising Africa on the Power Grid. Ed. D.A. McDonald. Cape Town: Earthscan: xv-xxiii.
- McIntyre, D. and G. Mooney (2007) The Economics of Health Equity. Cambridge: Cambridge University Press.
- McKibben, B. (2006) The coming meltdown. New York Review of Books **53** (1).
- McMichael, J., D.Campbell-Lendrum, R. Kovats, *et al.* (2004) Global Climate Change. In: Comparative Quantification of Health Risks: Global and Regional

- Burden of Disease Due to Selected Major Risk Factors. World Health Organisation. <http://www.news.wisc.edu/11878> Accessed May 2011.
- Meadows, D. H. (1972) Limits to Growth: A report for the Club of Rome's Project on the Predicament of Mankind. New York: Universe Books.
- Mészáros, I. (1970) Marx's Theory of Alienation. Bel Air: Paul & Co Pub Consortium.
- Mészáros, I. (2001) Socialism or barbarism. Monthly Review. <http://www.monthlyreview.org/1201jbf.htm> Accessed March 2011.
- Middleton, N. and P. O'Keefe (2001) Redefining Sustainable Development. London: Pluto Press.
- Milanovic, B. (2005) Worlds Apart: Measuring International and Global Inequality. Princeton, NJ: Princeton University Press.
- Miller, J. B. (2008) Carbon cycle: sources, sinks and seasons. Nature **451**: 26-27.
- Mills, J. S. (1909) Principles of Political Economy. London: Longman, Green and Co.
- Milne, C. (2007) Re-energising Australia. <http://christine-milne.greensmps.org.au/content/re-energising-australia> Accessed March 2011.
- Minerals Economics Directorate (2008) Labour statistics from the Minerals Statistical Tables 1984-2005. Minerals Economics Directorate Bulletin. B1/2008. Johannesburg: MED.
- Mohamed, S. (2009) Financialization, the Minerals Energy Complex and South African labour. Mumbai: Global Labour University Conference, Tata Institute for Social Sciences.
- Mol, A. and G. Spaargaren (2000) Ecological modernisation theory in debate: a review. Environmental Politics **9** (1): 17-49.
- Monbiot, G. (2003) The Age of Consent: A Manifesto For a New World Order. Oxford: Oxford University Press.

- Monbiot, G. (2006) Heat: How to Stop the Planet Burning. London: Allen Lane, Penguin Press.
- Monbiot, G. (2007) This crisis demands a reappraisal of who we are and what progress means. 14 December. London: The Guardian Weekly: 17.
<http://www.guardian.co.uk/commentisfree/2007/dec/04/comment.politics>
 Accessed March 2011.
- Monbiot, G. (2007a) Only full decarbonisation can save the earth. 14 December. London: The Guardian Weekly: 16-17.
www.guardian.co.uk/.../2008/nov/.../climate-change-carbon-emissions
 Accessed April 2011.
- Monbiot, G. (2008) The stakes could not be higher. Everything hinges on stopping coal. 4 August. London: The Guardian Weekly.
www.guardian.co.uk/commentisfree/2008/aug/05/kingsnorthclimatecamp.climatechange Accessed March 2011.
- Monbiot, G. (2010) BP's dumb investors. 21 June. London: The Guardian Weekly. <http://www.monbiot.com/archives/2010/06/21/bps-dumb-investors/>
 Accessed March 2011.
- Monthly Review (2004) The Editors. The Pentagon and climate change
Monthly Review **56**: 1.
- Mooney, G. (2009) Challenging Health Economics. Oxford: Oxford University Press.
- Morgan, F. (2006) The power of community. How Cuba survived peak oil.
www.communitysolution.org/ciba Accessed April 2011.
- Morris, D. and B. Worthington (2010) Cap or Trap. How the EU ETS risks locking-in carbon emissions. London, Sandbag.
www.sandbag.org.uk/.../2010/.../eu-emissions-trading-scheme-threatens-trap-
 Accessed March 2011.
- Morrow, R. (2006) Earth User's Guide to Permaculture. Pymble: Kangaroo Press.

- Mullard, M. (2004) The Politics of Globalisation and Polarisation. Cheltenham: Edward Elgar.
- Muller, Z. (2002) The Mind and the Market. Capitalism in Western Thought. New York: Anchor Books.
- Munnik, V. and D. Hallows (2009) From dirty energy to a climate friendly economy. www.ngopulse.org/article/dirty-energy-climate-friendly-economy Accessed April 2011.
- Munro, D. (2004) Method in political economy. A comment. Journal of Australian Political Economy **54**: 146-147.
- Muntzer, T. (1988) Collected Works. Edinburgh: T&T Clark.
- Myrdal, G., Ed. (1953) The Political Element in the Development of Economic Theory. London: International Library of Sociology.
- Myrhre, G., K. Alterskjær, *et al.* (2010) Addendum to 'A fast method for updating global fossil fuel carbon dioxide emissions'. Environmental Research Letters **5** (3).
- Nace, T. (2008) World's dumbest project: Tata Ultra Mega. How a twisted definition is setting up a monumental folly in India. <http://www.grist.org/article/worlds-dumbest-project-tata-ultra-mega/> Accessed April 2011.
- Nakhooda, S. (2010) The World Bank Eskom support Programme. <http://www.wri.org/stories/2010/03/world-bank-eskom-support-program> Accessed March 2011.
- Nandy, A. (1987) Traditions, Tyranny and Utopias: Essays in the Politics of Awareness. New Delhi: Oxford University Press.
- Narain, S. (2011) Editorial: How to approach environmentalism. Centre for Science and Environment. <http://www.cseindia.org> Accessed April 2011.
- National Oceanic & Atmospheric Administration (NOAA) (2010) Trends in Carbon Dioxide. Mauna Loa: U.S. Department of Commerce.

- Nations, U. (2007) The Millennium Development Goals Report. New York: United Nations.
- Navarro, V. (2002) Development and quality of life: A critique of Amartya Sen's *Development As Freedom*. In: The Political Economy of Social Inequalities. Ed. V. Navarro. New York: Baywood Publishing Company.
- Navarro, V. (2007) Neoliberalism as a class ideology: or, the political causes of the growth of inequalities. In: Neoliberalism, Globalization and Inequalities: Consequences for Health and Quality of Life. Ed. V. Navarro. New York: Baywood Publishing: 9-23.
- NEPAD (2009) Revision of the AU/NEPAD African Action Plan 2010-2015. Johannesburg: NEPAD.
- Newell, P. (2008) The marketization of global environmental governance: manifestations and implications. In: The Crisis of Global Environmental Governance. Eds. J. Park, K. Conca and M. Finger. London: Routledge: 77-95.
- Ngwane, T. (2010) South Africa in 2010: A history that must happen. Pambazuka News <http://pambazuka.org/en/category/features/68169> Accessed January 2011
- Nhemachena, C., J. Chakwizira, *et al.* (2008) Managing climate related stresses in southern Africa's agricultural sector. CSIR. www.csir.co.za/Built_environment/docs/poster28_lowres.pdf Accessed April 2011.
- Njanji, T. (2010) Zimbabwean refugee, Cape Town. Personal communication.
- Nussbaum, M. (2001) Upheavals of Thought. The Intelligence of Emotions. Cambridge: Cambridge University Press.
- OECD (2007) Pension news online. <http://www.oecdobserver.org/news/categoryfront.php/id/591/General.html>. Accessed April 2011.
- Oelofse, S. (2008) Emerging Issues Paper: Mine Water Pollution. The Council for Scientific and Industrial Research. CSIR. Department of Environmental

Affairs and Tourism. researchspace.csir.co.za/dspace/handle/10204/3242
Accessed March 2011.

Oreskes, N. (2004) Beyond the ivory tower: the scientific consensus on climate change. *Science* **306** (5702): 1686.

Oreskes, N. and E. Conway (2010) Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming. Bloomsbury: Climate Science Watch.

Owen, B. (2010) Rise of corporations and neoclassical ideology.
bruceowen.com/global/a340-09f-07-RiseOfCorpsNeoclassicalIdeology.pdf
Accessed March 2011.

Oxfam (2008) Another inconvenient truth: How biofuel policies are deepening poverty and accelerating climate change. Oxfam Briefing Paper 114. London: Oxfam.

Palley, T. I. (2007) Financialization: What It Is and Why It Matters. Working paper No. 525. Berlin, Levy Economics Institute.
<http://www.scribd.com/doc/33849533/Financialization-What-Is> Accessed April 2011.

PACJA (Pan African Climate Justice Alliance) (2009) Pan-African Climate Justice Alliance protest at COP15- UN negotiations.
http://www.youtube.com/watch?v=qM_8mIB7BSY Accessed April 2011.

PACJA (2010) The Pan-African Climate Justice Manifesto Declaration during the Pan African Conference on Climate Justice & Post- Copenhagen Dialogue, ACCRA, 13-17 March. www.pacja.org/index.php?option=com_content&view
Accessed March 2011.

Painceira, J. (2009) Developing countries in the era of financialisation: from deficit accumulation to reserve accumulation. London: School of Oriental and Asian Studies.

Pamuk, O. (2001) The anger of the damned. New York Review of Books

<http://www.nybooks.com/articles/archives/2001/nov/15/the-anger-of-the-damned/>. Accessed May 2011

Park, J., M. Finger, and K. Conca (2008) The death of Rio environmentalism. In: The Crisis of Global Environmental Governance. Eds. J. Park, K. Conca and M. Finger. London: Routledge.

Parnell, S., E. Pieterse, *et al.* (2010) Urban Imperatives for Africa: Transcending Impasses. Cape Town: African Centre for Cities.

Peace Parks News (2010) Objection to coal mine next to greater Mapungubwe TFCA. <http://www.peaceparks.org/Home.htm> Accessed April 2011.

Pearce, F. (2005) Take greenhouse polluters to the cleaners. New Scientist **2519**: 42.

Pearman, G. (2007) Evidence of accelerated climate change. Climate Adaptation Science and Policy Initiative at the University of Melbourne, November. <http://www.news.com.au/story/0,23599,22765560-421,00.html> Accessed April 2011.

Pearce, F. 2011. South Africa's white farmers are moving further north. 1 May. <http://www.guardian.co.uk/environment/2011/may/01/boers-moving-north-african-governments> Accessed March 2011.

Persson, A., B. Rothstein, *et al.* (2010) The Failure of Anti-Corruption Policies. A Theoretical Mischaracterization of the Problem. QoG Working Paper Series 2010:19 University of Gothenburg: Gothenburg. http://www.qog.pol.gu.se/working_papers/2010_19_Persson_Rothstein_Teorel1.pdf. Accessed April 2011.

Pimentel, D., P. Hepperly, J. Hanson, R. Siedel, *et al.* (2005) Environmental, energetic, and economic comparisons of organic and conventional farming systems Bioscience 55 (7): 573-582.

Polanyi, K. (1944) The Great Transformation. Boston: Beacon Press.

- Population Reference Bureau (2009) 2009 World Population Data Sheet. <http://www.prb.org/Publications/Datasheets/2009/2009wpds.aspx> Accessed April 2011.
- Pretty, J. (2009) Can ecological agriculture feed nine billion people? Monthly Review. <http://www.monthlyreview.org/091123pretty.php> Accessed March 2011.
- Raby, D. (2009) Why Cuba still matters. Monthly Review 60 (8): 1-13.
- Raffer, K. and H. W. Singer (2001) The Economic North-South Divide. Six Decades of Unequal Development. Cheltenham: Edward Elgar.
- Rajca, J. (2010) Wasteland: the \$7.8b of food Aussies throw away. Sydney: Sydney Morning Herald.
- Ranis, G. and S. Kosack (2004) Growth and Human Development in Cuba's Transition. Miami: Institute for Cuban and Cuban-American Studies, University of Miami.
- Redman, J. (2008) Dirty is the new clean: A critique of the World Bank's Strategic Framework for Development and Climate Change, Sustainable Energy and Economy Network Institute for Policy Studies. www.ips-dc.org/files/287/dirtyisnewcleanFINAL.pdf Accessed March 2011.
- Redman, J. (2008) World Bank: Climate Profiteer, Sustainable Energy and Economy Network. Washington D.C.: Institute for Policy Studies.
- Reich, R. (2007) Supercapitalism: The Transformation of Business, Democracy, and Everyday Life. New York: Alfred A. Knopf.
- Republic of South Africa (2009) South African Government Development Indicators 2009. <http://www.info.gov.za/view/DownloadFileAction?id=109313> Accessed March 2011.
- Reynolds, L. (2010) Climate Change and its Impact on Women's and Children's Health. E-Conference. 12 March. Cape Town: University of Cape Town.

Roberts, J. (2009) They Hide Things Like That from Us. The Hidden Epidemic Amongst Former Miners: Silicosis, Tuberculosis and the Occupational Diseases in Mines and Works Act in the Eastern Cape, South Africa. Johannesburg: Health Systems Trust.

Robinson, J. (1972) Consumers' sovereignty in a planned economy. In: Socialist Economics. Eds. A. Nove and D. M. Nutt. Harmondsworth: Penguin.

Rockström, J., W. Steffen, K. Noone, A. Persson, *et al.* (2009) Planetary Boundaries: Exploring the Safe Operating Space for Humanity. Ecology and Society 14 (2).

Rosenberg, T. (2002) Globalization; the free trade fix. New York: New York Times.

Rosewarne, S. (2002) Towards an ecological political economy. Journal of Australian Political Economy. **50**: 179-199.

Rosewarne, S. (2010/11) Meeting the challenge of climate change: the poverty of the dominant economic narrative and market solutions as subterfuge. Journal of Australian Political Economy. Special Issue: Challenging Climate Change. **66**: 17-51.

Rossman, P. (2010) What “financialisation” means for food workers. GRAIN <http://www.grain.org/seedling/index.cfm?id=668&print=yes>. Accessed March 2011.

Rossman, P. and Greenfield, G. (2006) Financialisation: new routes to profit, new challenges for trade unions. Labour Education No. 142.

Routledge, P. (1993) Terrains of Resistance: Nonviolent Social Movements and the Contestation of Place in India. Westport, Conn.: Praeger.

Ruccio, D. (2010) Shrinking wages, growing surplus. Real World Economics Review. Graph of the Month. <http://rwer.wordpress.com/2010/10/26/shrinking-wages-growing-surplus/> Accessed May 2011.

- Rutherford, J. (2008) The culture of capitalism.
http://www.lwbooks.co.uk/journals/soundings/articles/02_per_cent20s38_per_cent20_per_cent20rutherford.pdf Accessed April 2011.
- Rutledge, D. (2010) South Africa is nearing peak coal. Peak Oil News and Message Boards. <http://peakoil.com/geology/south-africa-is-nearing-peak-coal/> Accessed March 2011.
- Sachs, J. (2010) Climate sceptics are recycled critics of controls on tobacco and acid rain. 19 February. London: The Guardian.
<http://www.guardian.co.uk/environment/cif-green/2010/feb/19/climate-change-> Accessed March 2011.
- Sachs, W., Ed. (1993a) Global Ecology. A New Arena of Political Conflict. London: Zed Books.
- Sacsis (2009) South Africa's electricity crisis: Beyond the price debate.
[Sacsis.org.za/site/article/125.1](http://sacsis.org.za/site/article/125.1) Accessed March 2011.
- Saez E (2009) Striking it Richer: the evolution of top Incomes in the United States.
<http://elsa.berkeley.edu/~saez/saez-UStopincomes-2007.pdf> Accessed November 2011.
- SAFCEI (2010) National Climate Change Response Green Paper 2010. Kalk Bay: Southern African Faith Communities' Environment Institute.
www.safcei.org.za/ Accessed March 2011.
- Sainath, P. (2006) What exactly is "development"? Post-autistic Economics Review (38). www.paecon.net/PAEReview/issue38/Sainath38.htm Accessed March 2011.
- Sainath, P. (2006) Where India's brave new world is headed. Counterpunch.
<http://www.counterpunch.org/sainath04012006.html>. Accessed March 2011.
- Sample, I. (2005) Warming hits 'tipping point'. 11 August. London: Guardian Weekly.

<http://www.guardian.co.uk/environment/2005/aug/11/science.climatechange1>.

Accessed March 2011.

Samson, M. (2009) (Sub)imperial South Africa? Reframing the debate. Review of African Political Economy **36** (119): 93-103.

Sanderson, K. (2006) US biofuels: a field in ferment. Nature 444: 673-676.

Satgar, V. (2009) Global capitalism and the neo-liberalisation of Africa. In: A New Scramble for Africa? Imperialism, Investment and Development. Eds. R. Southall and H. Melber. Scottsville: University of KwaZulu-Natal Press: 35-55.

Saul, J. (1999) Sub-Saharan Africa in global capitalism. Monthly Review **51** (3).

Saul, J. S. (2001) Cry for the beloved country: the post-apartheid denouement. Review of African Political Economy **89**: 429-460.

SBS (2011) The Future of Food.

www.sbs.com.au/documentary/program/thefutureoffood Accessed March 2011.

Schalk, B. (2011) Expansion on track to deliver coal to Medupi. Johannesburg: Engineering News.

Science in Africa (2006) South Africa's greenhouse gas emissions under focus. <http://www.scienceinafrica.co.za/2006/september/greenhouse.htm> Accessed March 2011.

Scharlemann, J. P. W. and W. F. Laurance (2008) How green are biofuels? Science **319** (5867): 1238-1240.

Schellnhuber, H. J. (2008) Global warming: Stop worrying, start panicking? Proceedings of the National Academy of Sciences of the United States of America **105** (38): 14239-14240.

- Scialabba, N. E. (2007) Organic Agriculture and Food Security. International Conference on Organic Agriculture and Food Security. Italy, Food and Agriculture Organisation of the United Nations.
- Searchinger, T., R. Heimlich, *et al.* (2008) Use of U.S. croplands for biofuels increases greenhouse gases through emissions from land use change. Science **319** (5867): 1238-1240.
- Sen, A. (1978) On the labour theory of value: some methodological issues. Cambridge Journal of Economics **2**: 175-190.
- Sen, A. (2001) Economic progress and health. In: Poverty, Inequality and Health. Eds. D. Leon and G. Walt. Oxford: Oxford University Press.
- Sen, A. (2009) The Idea of Justice. London: Allen Lane.
- Shabangu, S. (2009) Budget Vote Speech by Ms Susan Shabangu, MP Minister of Mineral Resources on 23 June 2009. http://www.dmr.gov.za/Media_Room/Speeches.html Accessed March 2011.
- Shabangu, S. (2010) Department of Mineral Resources Budget Vote Speech. Department of Minerals and Resources. <http://www.search.gov.za/> Accessed March 2011.
- Sharife, K. (2010) South Africa's dirty secret: Eskom and the Medupi power plant. Pambazuka News. <http://pambazuka.org/en/category/features/64410> Accessed March 2011.
- Shiva, V. (1988) Reductionist science as epistemological violence. Science, hegemony and violence. In: A Requiem for Modernity. Ed. A. Nandy. New York: Oxford India Paperbacks: 232-256.
- Shiva, V. (1993) Monocultures of the Mind. Perspectives on Biodiversity and Biotechnology. Kuala Lumpur: Third World Network.
- Shiva, V. (2002) Water Wars. London: Pluto Press.
- Shiva, V. (2005) Earth Democracy: Justice, Sustainability and Peace. London: Zed Books.

- Shiva, V. (2007) Food, forests and fuel: from false to real solutions for the climate change. <http://www.zmag.org/sustainers/content/2007-12/13shiva.cfm> Accessed March 2011.
- Shiva, V. (2008) Soil Not Oil. Climate Change, Peak Oil and Food Insecurity. London: Zed Books.
- Simms, A. (2001) An Environmental War Economy. The Lessons of Ecological Debt and Global Warming. London: New Economics Foundation.
- Simms, A. and V. Johnson (2010) The Great Transition. London: New Economics Foundation.
- Simms, A. and V. Johnson (2010a) Growth Isn't Possible: Why Rich Nations Need a New Economic Direction. London: New Economics Foundation.
- Simon, S. and S. McBride, Eds. (2007) Neo-Liberalism, State Power and Global Governance. Dordrecht: Springer.
- Small, R. (2010) Abalimi Bezekhaya Newsletter, No 36. January. <http://abalimi.org.za/newsletters/nl36.pdf> Accessed March 2011.
- Smith, A. (1976) An Inquiry into the Nature and Causes of the Wealth of Nations. London: Clarendon Press.
- Smith, D. (2009) Zuma's political honeymoon slips into a Winter of discontent. 27 July. London: The Guardian Weekly. <http://www.guardian.co.uk/world/2009/jul/27/letter-from-africa-jacob-zuma> Accessed March 2011.
- Smith, K. (2007) The Carbon Neutral Myth. Offset Indulgences for Your Climate Sins. London: Carbon Trade Watch; Transnational Institute.
- Smith, K. (2008) The great Asian carbon swindle. New Matilda. newmatilda.com/2008/08/04/great-asian-carbon-swindle Accessed March 2011.
- Soederberg, S. (2009) Corporate Power and Ownership in Contemporary Capitalism. The Politics of Resistance and Domination. New York: Routledge.

Sourcewatch (2010) Global Climate Coalition.

http://www.Sourcewatch.org/index.php?title=Global_Climate_Coalition

Accessed March 2011.

Sourcewatch (2010a) Carbon Capture and Storage.

http://www.Sourcewatch.org/index.php?title=Carbon_Capture_and_Storage

Accessed April 2011.

SouthAfrica.Info (2009) Call for comment on Eskom tariff hike.

<http://www.southafrica.info/news/business/968564.htm> Accessed April 2011.

SouthAfrica.Info (2010) Mining and Minerals in South Africa.

<http://www.southafrica.info/business/economy/sectors/mining.htm> Accessed

April 2011.

Spencer, H. (1851) Social Statics: the Conditions Essential to Human Happiness. New York: Forgotten Books.

Spoor, R. (2009) Human Rights and Occupational Health Attorney, White River, Mpumalanga Province. Personal Communication.

Spratt, D. and P. Sutton (2008) Climate Code Red. Fitzroy: Friends of the Earth.

Spratt, D. (2011) When the climate breaks bad, will there be answers? Dissent. No. 35 Autumn/Winter.

Stanlake, G. F. and S. J. Grant (1995) Introductory Economics. London: Longman.

Statistics South Africa (2009) Labour Force Survey and Quarterly Labour Force Survey. <http://www.statssa.gov.za/cpi/index.asp> Accessed April 2011.

Stern, D. (2003) Energy and Economic Growth.

[http://www.localenergy.org/pdfs/Document per cent20Library/Stern per cent20Energy per cent20and per cent20Economic per cent20Growth.pdf](http://www.localenergy.org/pdfs/Document%20Library/Stern%20per%20Energy%20and%20Economic%20Growth.pdf)

Accessed March 2011.

Stiglitz, J. (2003) Globalization and Its Discontents. London: W. W. Norton & Company.

- Stiglitz, J. (2006) Making Globalization Work. The Next Steps to Global Justice. London: Penguin Books.
- Stilwell, F. (2000) Changing Track: A New Political Economic Direction for Australia. Annandale: Pluto Press.
- Stilwell, F. (2006) Political Economy. The Contest of Economic Ideas. Oxford: Oxford University Press.
- Stilwell, F. and K. Jordan (2004) The political economy of land: putting Henry George in his place. Journal of Australian Political Economy **54**: 119-134.
- Stockholm Resilience Centre (2010) Rockström, J., W. Steffen, *et al.* Planetary boundaries: exploring the safe operating space for humanity. Ecology and Society **14** (2): 32. <http://www.ecologyandsociety.org/vol14/iss2/art32/> Accessed March 2011.
- String Communications (2009, 2010) Little hope of land claims progress. http://www.sadelivery.co.za/index.php?option=com_content&view=article&id=891_per-cent3A-little-hope-of-land-claims-progress&Itemid=2 Accessed March 2011.
- Sturm, D. (1988) Democratic theory and corporate governance. International Journal of Value Based Management **1** (1).
- Sweezy, P. M. (2004) Monopoly Capitalism. Monthly Review. <http://monthlyreview.org/1004pms2.htm> Accessed April 2011.
- Swilling, M. (2010) Intelligent power: SA is throwing it all away. Cape Town: Cape Times: 9.
- Taylor, C. (1991) The Malaise of Modernity. Toronto: Anansi.
- Terreblanche, S. (2002) A History of Inequality in South Africa 1652-2002. Scottsville: University of Natal Press.
- The Mail and Guardian (2010) SA mothballs Pebble Bed Modular Reactor project September 17 2010. <http://mg.co.za/article/2010-09-17-sa-mothballs-pebble-bed-modular-reactor-project> Accessed March 2011.

The World Social Forum (2009) The World Social Forum, Belém, Brazil.

<http://ipsterraviva.net/tv/wsfbrazil2009/> Accessed March 2011.

Third World Network (2010) Civil society voices rise gainst World Bank loan to Eskom. 2 April.

www.twinside.org.sg/title2/climate/info.service/.../ESKOM_TWN_per_cent20.pdf Accessed April 2011.

Third World Network (2010) The financial crisis and challenges facing Africa. 9 July. TWN Information Service on Finance and Development.

<http://www.twinside.org.sg/title2/finance/2010/finance100702.htm> Accessed April 2011.

Thom, A. (2006) Widening gulf between Khayelitsha and Cape Town.

www.health-e.org.za Accessed March 2011

Tickell, O. (2008) Kyoto 2: How to Manage the Global Greenhouse. London: Zed Books.

Toulmin, C. (2009) Climate Change in Africa. London: Zed Books.

Toye, J. (2003) The International Monetary Fund (IMF) and the World Bank (WB). In: The Handbook of Globalisation. Ed. J. Michie. Cheltenham: Edward Elgar.

Trainer, T. (1990) A rejection of the Brundtland Report. IFDA Dossier **77**: 71 - 84.

Trainer, T. (1995) The Conserver Society: Alternatives for Sustainability. London: Zed Books.

Trainer, T. (1998) Saving the Environment: What It Will Take. Sydney: UNSW Press.

Trainer, T. (2007) Renewable Energy Cannot Sustain a Consumer Society. New York: Springer.

UNEP (2006) Global Deserts Outlook.

<http://www.unep.org/geo/gdoutlook/001.asp> Accessed March 2011.

UNFPA (2010) State of World Population 2010. From Conflict and Crisis to Renewal: Generations of Change. New York: United Nations Population Fund.
http://www.unfpa.org/swp/2007/presskit/pdf/sowp2007_eng.pdf Accessed March 2011

Union of Concerned Scientists (1992) World scientists' warning to humanity.
<http://www.ucsusa.org/about/1992-world-scientists.html> Accessed March 2011.

United Nations Habitat Report (2008) The State of African Cities. A Framework for Addressing Urban Challenges in Africa. Washington: United Nations: 206.

United Nations' Human Development Report (2010) The Real Wealth of Nations: Pathways to Human Development 20th Anniversary Edition _
<http://hdr.undp.org/en/mediacentre/> Accessed March 2011.

U.S. Census Bureau (2010) <http://www.census.gov/> Accessed January 2011.

van der Merwe, C. (2009) Coal of Africa submits environmental study for Vele colliery Mining Weekly. 20 May. www.miningweekly.com/article/coal-of-africa-submits-environmental-study-for-vele-colliery-2009-05-20,\ Accessed March 2011.

van Onselen, C. (1996) The Seed is Mine. The Life of Kas Maine, a South African Sharecropper. Johannesburg: Jonathon Ball Publishers.

Vanberg, V. (1994) Rules and Choices in Economics. London: Routledge.

van der Merwe, C. (2009)
www.miningweekly.com/article/coal-of-africa-submits-environmental-study-for-vele-colliery-2009-05-20 Accessed March 2011.

Vidal, J. (2008) Billions wasted on UN climate programme. 30 May. London: The Guardian Weekly.
www.guardian.co.uk/.../2008/.../climatechange.greenpolitics Accessed March 2011.

- Vidal, J. (2009) Global warming causes 300,000 deaths a year, says Kofi Annan think-tank. London: The Guardian Newspaper.
<http://www.guardian.co.uk/environment/2009/may/29/1> Accessed March 2011.
- Vidal, J. and Adam, D. (2007) China overtakes US as world's biggest CO2 emitter. 19 June. The Guardian Weekly.
<http://www.guardian.co.uk/environment/2007/jun/19/china.usnews> Accessed March 2011.
- Von Maltitz, G. P. and R. J. Scholes (2006) Vulnerability of Southern African Fauna and Flora to Climate Change. AIACC Working Paper No. 24. Cape Town: CSIR.
- Wackernagel, M., W. Rees, *et al.* (1995) Our Ecological Footprint: Reducing Human Impact on the Earth. Philadelphia: New Society Publishers.
- Wallerstein, I. (1976) The Modern World-System: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century. New York: Academic Press.
- Ward, B. and R. Dubois (1972) Only One Earth. New York: W.W. Norton.
- WCED (1987) Our Common Future. Oxford: Oxford University Press.
- Weaver, A. J., A. Zickfeld, *et al.* (2007) Long term climate implications of 2050 emission reduction targets. Geophysical Research Letters **34** (L19703).
- Weingast, B. and D. Wittman, Eds. (2006) The Oxford Handbook of Political Economy. London: Oxford University Press.
- Weston, D. (2011) The politics of climate change in South Africa. In: Durban's Climate Gamble. Ed. P. Bond. Pretoria: UNISA Press.
- WHO (2001) Commission on Macroeconomics and Health. Macroeconomics and Health: Investing in Health for Economic Development. Geneva: WHO.
- WHO/UNICEF (2008) A Snapshot of Drinking Water and Sanitation in Africa. A regional perspective based on new data from the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation. Washington,

Prepared for AMCOM as a contribution to the 11th Summit of Heads of State and Government of the African Union With special theme: Meeting the Millennium Development Goal on Water and Sanitation.

www.wssinfo.org/download?id_document=1277 Accessed April 2011.

Wightman, J. (2010) Soil and Climate Change. Soil Health Conference.

<http://www.njsoilhealth.org/conf/> Accessed March 2011.

Wilkinson, R. and K. Pickett (2009) The Spirit Level. Why More Equal Societies Almost Always Do Better. London: Allen Lane.

Williamson J (1990) What Washington Means by Policy Reform. Chapter 2.
Williamson, J. (ed.) Latin American Adjustment: How Much Has Happened?
Washington: Institute for International Economics.

Williamson, J., (2002) Latin American Adjustment: How Much Has Happened
Chapter 2 in What Washington Means by Policy Reform. J. Williamson (ed)
Washington: Peterson Institute for International Economics.

Wilson, J. S. and V. O. Abiola, Eds. (2003) Standards and Global Trade. A Voice for Africa. Washington, D.C.: World Bank.

Windsor, C. and P. McNicholas (2009) Can the financialized atmosphere be effectively regulated? A critical analysis of the proposed Australian carbon pollution reduction scheme as a complex market solution to global warming.
8th Australasian conference on social and environmental accounting research.
Christchurch, New Zealand.

World Bank (2010) World Bank Development Indicators 2010. Washington: World Bank. <http://data.worldbank.org/data-catalog/world-development-indicators/wdi-2010> Accessed March 2011.

World Bank (2009) Draft Safeguards Diagnostic Review for South Africa Eskom Investment Support project. Washington, World Bank.
<http://siteresources.worldbank.org/INTSOUTHAFRICA/Resources/Final-SDR-EISP.pdf> Accessed April 2011.

World Bank (2009a) Sub-Saharan Africa. Regional Fact Sheet From the World Development Indicators 2009. Washington: World Bank.

http://siteresources.worldbank.org/DATASTATISTICS/Resources/ssa_wdi.pdf

Accessed March 2011.

World Social Forum (2009) http://www.climate-justice-now.org/category/reports_and_publications/climate-justice-at-the-world-social-forum/ Accessed March 2011.

World Wildlife Fund (2006) Living Planet Report 2006.
http://www.cosg.org.uk/WWF_Report.htm Accessed March 2011.

Worldwatch Institute (2008) State of the World 2008: Ideas and Opportunities for Sustainable Economics. Washington, World Watch Institute.
<http://www.worldwatch.org/mission> Accessed March 2011.

Worldwatch Institute (2009) China: Olympic-Sized Growth in Carbon Emissions. Washington, World Watch Institute.
<http://www.worldwatch.org/node/5842> Accessed March 2011.

Worster, D. (1993) The shaky ground of sustainability. In: Global Ecology. A New Arena of Political Conflict. Ed. W. Sachs. London: Zed Books.

Wright, E. O. (2010) Envisioning Real Utopias. London: Verso.

Xie, X. (2008) Carbon sequestration: injecting realities. Energy Tribune.
www.energytribune.com/.../Carbon-Sequestration-Injecting-Realities Accessed March 2011.

Young, G. (2008) America has a terrible headache, but it seems like no one wants to cure it. *Guardian Weekly* 29 September
<http://www.guardian.co.uk/commentisfree/2008/sep/29/uselections2008.useconomy1> Accessed March 2011.

Zack-Williams, A. and G. Mohan (2007) Imperial, neo-liberal Africa. Review of African Political Economy **34** (113): 417-422.

Zalta, E. N., Ed. (2010) Stanford Encyclopaedia of Philosophy. Stanford: Stanford University Press.

Zille, H. (2010) Zille says ANC stands to make R1bn from Medupi. 3 April. Mail and Guardian. <http://www.mg.co.za/article/2010-04-03-zille-says-anc-stands-to-make-r1bn-from-medupi> Accessed March 2011.

Zizek, S. (2009) First as Tragedy, Then as Farce. London: Verso.

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